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HEATING AND VENTILATION.

APART from plan there is no more important practical question connected with building than the provision of adequate means of lighting, heating and ventilation. A survey of almost any old building will convince us of this fact. The demolition of historical buildings of interest is condemned by lovers of art as vandalism, but in an enormous number of cases the *force majeure* of circumstances compels the adoption of a course which we all regret, and the issue is mainly decided by bad planning, imperfect lighting and the impossibility of adequate heating and ventilation. We may erect buildings which are works of art, but if they fail in the essentials we have enumerated they are as surely doomed to destruction as though their materials were falling into a state of decay, and for these reasons it is necessary that those who wish to "build for eternity" should keep abreast of the means which science places in our hands of devising methods by which the health and comfort of occupants can be secured which methods are becoming more numerous and varied with every passing decade. Efficient care and trouble taken in these matters means that a small space may often be more useful than a large one, and many of us will remember the experience gained during the Franco-Prussian War when doctors found that the death-rate of the wounded who were placed in churches transformed into hospitals was far greater than among those in the roughest of temporary buildings and in open tents. The conditions in many of our greatest public schools would be condemned in any of our elementary educational buildings, and it may be broadly stated that while the wealthy live in comfort their children are taught in unhygienic buildings, and at a time when considerations of health should be paramount are exposed to deleterious influences, while the children of the slums are taught in better buildings than those in which they live.

Many have experienced the discomforts of some of our great historic houses, even when provided with ample service, a discomfort which is mitigated but not done away with by bedroom fires and hand-carried hot water; and most of us know by experience the comforts of our best modern hotels, which may, without exaggeration, be said to be greater than those found in almost any private house, even those of the wealthiest, the reason being that in the first the resources of science are utilised because it is known they will be insisted upon, whereas in the other they are too frequently overlooked, because it is assumed that no one will expect them. The American house is comfortable in the coldest weather, because no one would put up with the discomforts involved by the absence of adequate heat; but here, with a smaller range of temperature, we are too often content to shiver in discomfort, solacing ourselves by grumbling at cold which we only escape from when in bed, or when we take exercise. The architect who makes his clients comfortable will probably succeed despite the fact that he may fail in æsthetic ability; the architect who has this ability but neglects to secure adequate heating will probably never succeed in establishing a good practice, because a few degrees of temperature make the whole difference between misery and comfort. We believe that an architect will be wise to persuade his clients to supplement the open fire by some system of heating in every case where funds permit, and that he will do well if he cuts down other expenses to make this possible. We have been told that the simplest and cheapest of all systems—that of hot air conveyed by channels under the floors to all rooms—is not practicable here, but we have never heard a convincing proof of the reasons why it should not be so. But in the simplest or smallest of houses there is usually a possibility of installing an anthracite stove in a hall or the staircase, and passages are channels of communication through which the heated air can circulate. There are also many ingenious patent grates which afford means of combining some of the advantages of a heating system with the beloved open fire. After these simple expedients various kinds of water and gas radiators may be mentioned, and it must always be borne in mind that if they are projected from the first their installation is a far cheaper thing than if they have to be added subsequently. And it may be noted that if they are so installed it is usually possible to effect very considerable savings in the number and consequent expense of fireplaces. For public buildings and offices there are dozens of systems, and it becomes more possible also to effect savings, as fireplaces can be omitted with less objection than in houses; for it is usually more essential in an office to save space than it is in a house, and every fireplace saved means that room is provided for additional furniture. Nor must we forget the importance of diminishing the smoke cloud which hangs over many of our towns. In addition we have the saving which is involved in using less coal, the saving of trouble and service, which after the war, will be more important items than ever before and the saving of brickwork in chimney-stacks. We should all of us regret the absence of chimneys in our country houses, but though they are undeniably picturesque we should accustom ourselves to their omission, and if our communities were cleaner and brighter there would remain a balance of advantages on the other side.

There seems to be no end to the possible adaptations in the use of gas for heating and cooking, and it has this great advantage over other methods—that it is frequently comparatively inexpensive and easy to use when dealing with old premises. Gas is used in so many forms that it is probable that if it were ever generally superseded by electric light for lighting purposes, more and not less of it would yet be used. Gas and oil products are likely to become the almost universal means of producing heat in the future, while coal is becoming more used for producing gas than as the prime agent in heating. We may probably look forward in the future to a great extension of the science of ventilation, and here again motion must be produced, either by heat or by mechanical means the foundation of which depends on heat. It has been demonstrated of late years that the purity of the air we breathe is less important to our health than its stagnation or motion, and the recognition of this fact adds to the importance of ventilation as a science; while the conditions which obtain in our hospitals will more and more become a standard which we shall have to aim at in other buildings. Means of artificial lighting are constantly being enormously improved, and it is quite within the bounds of possibility that science will one day invent methods by which artificial lighting can be produced which will be hygienically as satisfactory as direct sunlight; and when that time comes, it would profoundly affect the design of many buildings, though not of our houses, for we shall always value the openings which give out into the world of Nature, but of our great commercial buildings in which considerations of the utilisation of space are paramount. In any case, we shall be safe in assuming that Lighting, Heating and Ventilation, treated as sciences, will more and more be necessary factors in the architect's education, without which his education will be defective; and those who have devoted themselves to these callings in any of their many branches are doing a most useful work in the life of civilised communities.

NOTES.

The Predatory Public.

A CONSIDERABLE section of the public are now very anxious to get something for nothing, and from a housing discussion at the Conway Council, we quote the following gem of wisdom:—"Mr. G. H. Edwards said that when the Council were engaged on the housing schemes some years ago they paid a considerable sum of money for plans which afterwards they found would entail a prohibitive expense in construction. They seemed to come up against the professional man. He did not want to decry the professional man, who must have a living like everybody else, but the committee thought at that time that the architect's fees were excessive. His purpose in raising the matter was to suggest that the Government should, in taking up the question of housing, simplify the machinery, and should supply plans for cottages themselves. Cottages did not require much architecture; they were not cathedrals. Why not have standardised cottages as well as standardised ships?" We suppose, unless the worthy counsellor is a millionaire, that he makes his money in some occupation or other, and would probably be the first to object to the idea that it was either possible or right to eliminate him, and for the Government to do his work at a standardised rate. These very silly people seem to imagine that what the Government does has not to be paid for, or that Governments spend out of a private and mysterious fund of their own, whereas in reality they have no money, and secure what they spend by the taxation of the wealth created by private enterprise. More than this, Government work is usually expensive work, and often bad work done by incompetent people who are protected from the results of their incompetence by their official positions. We wish the members of many of our public bodies had to pass an examination to test their competence to "represent" the people, for we believe an enormous amount of chaff and very little wheat would be found. Meanwhile we would remind Mr. Edwards that the more they obtain Government assistance the more they will have to pay in rates and taxes, and they will not find it expedient in the long run to encourage the spoliation of people of other callings, for, generally speaking, the application of the system to themselves would be bitterly and strenuously resented. We do not believe it would be found that Mr. Edwards earns his money with more effort than the average architect, though we know little of the reasons which have induced the possibly too credulous people of Conway to allow him to speak for them. What is most wanted on the termination of the war is the speedy ending of the various "controls" which now exist, and for which the country will have paid a heavy price, and the inculcation of a little more honesty into our public life. When officials have been tested and appraised or condemned by the merit of their work, we shall have more confidence in the wisdom and efficiency of those who remain.

Mr. Thomas Mawson.

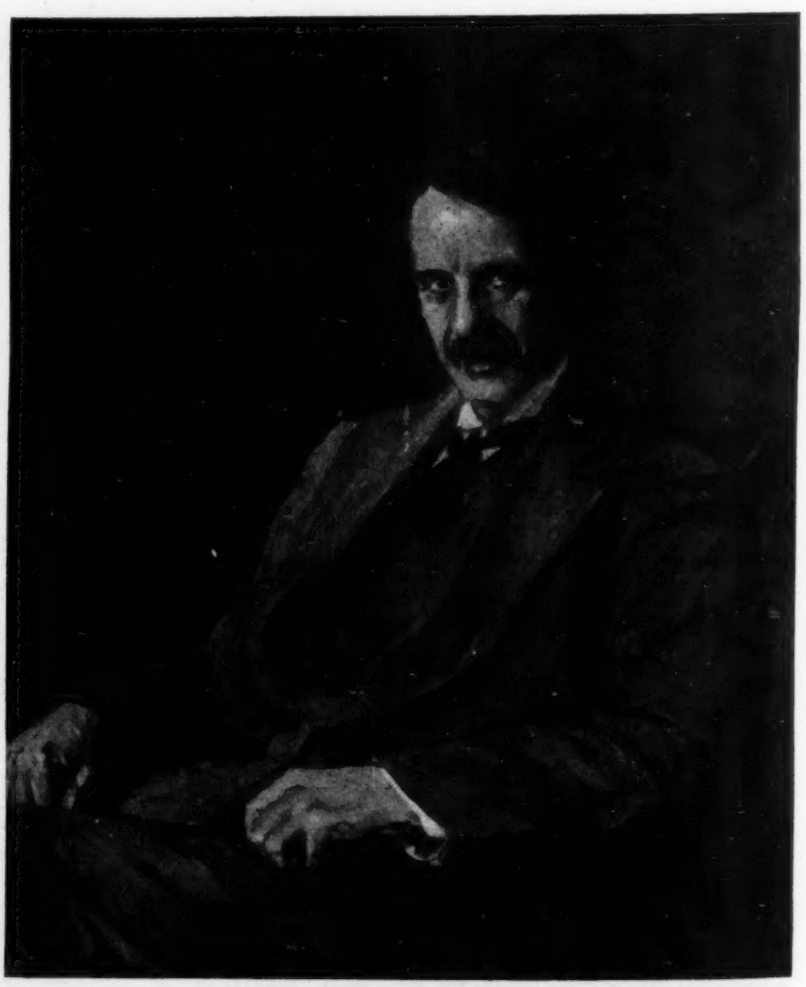
WE give a reproduction of an excellent portrait of Mr. Thomas Mawson (from a painting by Herkomer), who has been commissioned to prepare plans for the rebuilding of Salonica after the war, which is actually a larger scheme than the rebuilding of London after the Great Fire of 1666. One feature of it will be the planning of one great central station, which will replace the five which existed before the fire. The whole scheme will take a long series of years to complete, and it is, perhaps, fortunate for the success of Mr. Mawson's scheme that he has Southern Europeans to deal with rather than our own people, who so frequently spoil a good thing by cutting out its salient features from motives of economy.

A Decorative Panel.

THE work of MR. Gilbert Bayes as a sculptor is noteworthy to us all for its virility and refinement. In the panel on our next page the decorative quality is admirable, and an artist who can produce work like this ought to find a wide field and ready market for his skill. This is just the broad, simple, telling work which architects like to get in their buildings. It is in low relief, and, if we remember right, has a red incised outline.

The British Museum Proposal.

IT has been suggested to us, and we consider the suggestion an excellent one, that the British Museum Library should be replaced by an independent National Library, and if this were done, the central domed Reading Room would form an admirable gallery, which could be treated architecturally in any way, as it is at present a mere structural skin. Were this done, further space would be provided for big exhibits, while the former Reading Room would be an admirable connection between the galleries placed round it when the buildings were finally completed by new east and west wings. The central space might form the "Hall of Heroes" if the proposed scheme suggested for the War Museum is to be an essential feature of that building, and there is no reason why the ultimate treatment of the space might not be based on that of the Pantheon, which is perhaps the most impressive interior of the ancient or modern world. It would be an immense gain if we could have a National Library, which, with the constant multiplication of books, needs a greater space than can be given within the confines of the British Museum. What we hope is that any committee which has to deal with the question will give full consideration to the various suggestions made, and not commit itself and the public to some immense scheme resting on a false hypothesis of necessity. There is absolutely no reason for haste, and, as we pointed out last week, it is most unfair to those who have the first claim to consideration if an independent building is to be designed, to rush the scheme. We would rather see our ministers concerning themselves about the war than about schemes after the war, which can well wait. They are in power to finish the war, not to embark on ventures which are the concern of a fresh administration elected by the people—including the soldiers and the sailors who have fought in the war. If the proposed National War Museum is to be erected, it should be the subject for competition amongst architects of the whole Empire, as suggested in the letter sent by the R.I.B.A. to the Prime Minister. (See next page.)



MR. THOMAS MAWSON, Hon. A.R.I.B.A.

The Water Cart: A Decorative Panel. By MR. GILBERT BAYES. (See previous page.)

THE RECONSTRUCTION OF ROADS AFTER THE WAR.

THE seventh annual report of the Road Board (of which Sir George S. Gibb is chairman) has been published as a Blue-book. The report states:—"Since the outbreak of war great advantage has been derived from the improvements effected in important roads throughout the country with the assistance of grants and loans from the Road Improvement Fund. But the heavy motor traffic, directly or indirectly connected with military movements and the transit of warlike stores, has caused a great deal of damage to many miles of road, and, notwithstanding the expenditure of nearly one and a half million, which represents the cost of special work on public roads paid for out of Army funds and other Government contributions, an extensive road mileage, used by the special traffic referred to, has greatly deteriorated in condition. A considerable amount of expenditure will have to be incurred on these roads after the war. Many other roads have also suffered damage by the substitution of motor traffic for horse-drawn traffic in connection with agricultural operations in some counties. Concurrently with these things the expenditure of highway authorities on maintenance has been reduced, partly for financial reasons and partly owing to shortage of labour and materials. There will, therefore, be a considerable leeway to be made up after the war before roads can be restored to their pre-war condition.

"Meanwhile the policy of the Board in regard to making grants and loans has been continued on the lines laid down by the Treasury. During the current year the Board are distributing, with Treasury sanction, a sum of £200,000 out of the Road Improvement Fund, mainly in the form of assistance to expenditure on tar treatment of main county roads in Great Britain which are in a suitable condition for tar treatment, and in doing so they are endeavouring to secure that sections of road which were improved with the aid of Road Board grants prior to the war shall be preserved, as far as possible, in a condition which will prevent the benefit of improvements already made being lost.

"The Board have continued the special work which they undertook after the outbreak of war at the request of the Army Council, namely:—(1) To supervise and arrange for the construction and maintenance of new roads, and the improvement of certain private roads in several districts for military purposes in connection with camps and otherwise, and to carry out such work, where required, by direct labour; (2) to arrange with highway authorities for improvements on public roads, mainly at the cost of the Army Council, required for military purposes, and to supervise, or to carry out by direct labour, the execution of the improvements; (3) to settle by negotiation with highway authorities the amounts payable by the Army Council in respect of damage caused by extraordinary traffic in connection with military purposes. Similar work has, with Treasury approval, been undertaken for the Admiralty, Ministry of Munitions, and Timber Supply Department of the Board of Trade."

In a memorandum addressed to the Reconstruction Department on January 19, 1917, the Board say that the urgent need at the present time is the reconstruction of roads too weak to carry modern traffic. "The total mileage," it is stated, "of roads in England and Wales is 152,000. It may be assumed that 10 per cent. of the total, or about 15,000 miles, stand in need, more or less urgent, of reconstruction or strengthening, as distinguished from resurfacing in the course of ordinary maintenance, in order to enable the roads to carry the growing motor traffic. The cost of reconstruction may be estimated at from £1,000 to £4,000 per mile, or at an average of £2,000 per mile. The total cost of dealing with 15,000 miles may be estimated, therefore, at approximately £30,000,000 over and above the normal expenditure of the local authorities on current and deferred maintenance."

THE PROPOSED NATIONAL WAR MUSEUM.

The following letter has been addressed from the Royal Institute of British Architects to the Prime Minister:—

SIR,—The Council of the Royal Institute of British Architects has noted the announcements in the Press respecting the proposed National War Museum, a project which, as outlined, promises to be the most important ever undertaken in this country, and one which should command the highest architectural qualities of which the Empire is capable.

The Council is deeply impressed with the great importance of the work and the opportunities, which it will afford for a National and Imperial monument worthy of the events which it will commemorate; and wishes, therefore, respectfully to suggest that when the time comes for considering the means by which a suitable design may be secured it may be decided that the most desirable procedure will be by a public competition amongst the architects of the whole Empire.

The Council of the Royal Institute of British Architects would be prepared to co-operate and assist in the organisation of such a competition if called upon to do so, and would be pleased to send a deputation to lay before you its views if thought desirable.—We are, Sir, your most obedient servants,

HENRY T. HARE, *President.*
E. GUY DAWBER, *Hon. Secretary.*

OVERCROWDING IN EDINBURGH.

Some facts as to the housing difficulty in Edinburgh, together with suggestions for a remedy, have been formulated, says the *Scotsman*, by a committee representing various bodies in Edinburgh.

Overcrowding, it is explained, takes two forms—overcrowding in certain areas by there being too many houses per acre, and overcrowding in houses by there being too many persons per room. Apart from the question of overcrowding, many of the houses at present occupied are most unsatisfactory from the point of view of either health or convenience. A very large number would not allow of the observance of the amenities of civilised life. In 1911 there were 6,877, or 9.9 per cent., one-roomed houses in Edinburgh, and 22,031, or 31.6 per cent., two-roomed. Many of these houses are the result of the sub-division of larger houses. The great majority are "back to back." In other respects they conflict with the rules now laid down for new houses.

A survey, it is urged, should be made of one and two-roomed houses, and a period fixed, according to their general condition and to their effect on the health of their occupants, within which they must be either closed or rebuilt. A new standard should be insisted on in rebuilding or remodelling, and an endeavour made to wholly eliminate the one-roomed and as far as possible the two-roomed house.

No block tenements, it is advised, should be built in suburban areas. The houses should be of the cottage type, with garden attached. A limit should be fixed to the number of houses per acre, and to the number of dwellings under one roof. A minimum standard for family occupancy should be insisted on. It should not be less than four rooms or three rooms and a scullery. All new houses should be provided with a bath. It will require 66 acres per year to provide sites for the 990 new houses annually required under the scheme. A belt of land one mile wide round the existing city boundaries would give space for this annual extension for over fifty years, even allowing half of this area to be devoted to public parks or other uses.

Private enterprise, the Committee observe, has had a long run. Its products—dear land, congested areas, unhealthy houses, crowded dwellings, and the painful records of disease and death—proclaim its failure. No inducement should be offered, no public money should be given to prolong the life of a system that has failed through its inherent defects. The time has come for municipal action. There should be a special department and officials to deal with this matter of housing and town planning. The duty of this department would be the systematic planning of the whole city.

THE ANTIQUITIES OF COVENTRY.

We take the following from an address delivered by Mr. J. Crouch, F.R.I.B.A., of Birmingham, in St. Mary's Hall, Coventry, at the annual meeting of the Coventry City Guild :—

As I understand it, the objects for which the Coventry City Guild was founded are the preservation of all features of antiquarian and artistic interest in the city. May I be permitted to give a few reasons why we are anxious to preserve as far as is possible what is left of the work of our ancestors and why we are concerned with that spirit which looks with indifference upon that heritage of beauty which has come to us from our fathers?

It is a curious fact that what is known as the Romantic Movement in English literature should have come into existence at the moment when what we call the Industrial Era was in its infancy. It was as though the poets, with the sure vision of the seer, saw clearly the way that England was to take and where this new road would lead. They saw that if the new theories became facts the face of England would be changed, and they feared that, perhaps, the new would not be in all respects as good as the old, and so Wordsworth described the beauties of unspoilt nature and Scott told the story of times that were romantic and which were daily becoming more remote. The same spirit set the English landscape painters to work to place on record with feverish haste the beauties that were left, as though they feared that if the spirit of the times had its way nothing would remain but an England filled with endless factory chimneys and sordid industrial towns. It might be a question worth studying as to how our ancestors contrived to carry on their business without destroying the beauty of their surroundings, and why our modern activities have left such scars on the face of nature and compelled men to live in an atmosphere of ugliness that is a reproach and a disgrace to our so-called civilization. The fact is, modern industrialism has to a large extent destroyed that which at the beginning of the industrial system was the common property of all—the faculty to produce and appreciate beauty and orderliness in one's daily surroundings. I defy you to find anywhere in England that has not been disfigured by our modern industries a bit of country that is not beautiful, or any old town that is not a place of quiet charm. I am afraid, too, that the men who inaugurated the modern system did a great deal of the mischief with their eyes open. They preferred riches to beauty. Do you remember, in the last chapter of "Shirley," Charlotte Brontë puts into Robert Moore's mouth words that must have been the secret ambition of thousands of Englishmen of that day :—

"The copse shall be firewood ere five years elapse: the beautiful wild ravine shall be a smooth descent: the green natural terrace shall be a paved street: there shall be cottages in the dark ravine and cottages on the lonely slopes; the rough pebbled track shall be an even, firm, broad, black, sooty road, bedded with the cinders from my mill, and my mill, Caroline, my mill shall fill its present yard."

Robert Moore's dream has been realized over a large part of England during the past hundred years, but there is, I am glad to know, a growing feeling of dissatisfaction with many of the results of the system.

The particular side of the question that concerns the members of the Coventry City Guild is the apparent indifference of those who are interested in industrial development to those features of antiquarian and artistic interest which still remain to tell the story of a time when Coventry was probably one of the most beautiful cities in England. John Ruskin and William Morris were always insisting on the difference between wealth and riches, and it is because we have not learnt the real meaning of these two terms that many of the evils that we deplore are allowed to exist. What our fathers understood by the word wealth was the means whereby men could live a decent life, and somehow they contrived things so that in all their daily surroundings, on the whole, beauty and orderliness should prevail.

One of the objects of this society is the formation of a city museum. Now, what is it proposed to house in this museum? I should have been surprised if there had been a society formed for the purpose of collecting and storing articles of daily use made in the times in which we are living. Who would give twopence for the purpose of providing accommodation for pots and pans and tables and chairs, or fabrics of any kind made to-day? Why is it that at South Kensington and in our museums all over the country, large sums have been expended in the housing of and for the purchase of fragments of old painted and woven fabrics, of worm-eaten furniture and old pots and pans? How is it that people who have money and who know the value of it, give large sums gladly for some of this wreckage from a past age? How is it that our students of art, who are the designers of the future, study with patient, loving care this old work? Who would think of sending such a student to copy a modern piece of work? Is it not because everyone who has studied art at all, or who has the true instinct for beauty, knows without question that there is an indescribable charm and fitness about this old work that is entirely absent from the modern article, however well trained or clever the designer may be, or however skilful the craftsman? When we examine the old and the new together we are compelled to say, "The old is better." I have, among other things that I prize, a small collection of what is known as Liverpool ware. They add, I think, an air of distinction to my house, and these specimens which I prize, perfect in outline, complete as to their decoration, were once jugs out of which the yokel quaffed small beer in a village pub. Your old china, your gate-legged tables, your Chippendale chairs, and your antique copper ornaments, were once upon a time articles in common use in the cottage of the labourer, the homestead of the farmer, or the parlour of the squire or the town merchant. And they are all beautiful. I think, if I had time, and this was a suitable occasion, I could tell you why they are beautiful, but at least I can give you a bit of advice. I have studied art carefully for many years, I have collected old furniture and china and such-like since I left school, and I can tell you this: if you buy any of the things that were made for common household use up to, say, a hundred years ago, you cannot make a mistake, because up to that time the instinct of the craftsman was perfect and the tradition of good work and good design was universal. That is one of the reasons, ladies and gentlemen, why the Coventry City Guild desire to found a museum, and those are the kind of articles which, I hope, you will collect. If I were a Coventry boy I would be an industrious apprentice and stick to my work and try and get into the City Council and be Mayor of Coventry, if only for the pleasure of sitting in that delightful mayor's parlour, with that beautiful old panelling and that charming old furniture. I don't think I should enjoy the civic banquets because, although you have a wonderful mediæval kitchen, the joints and puddings are cooked in a horrid, ugly, modern range.

I have said that mediæval Coventry was one of the most beautiful cities in England. Its numerous churches, garnished with imagery, "exceeding magnifical," its religious houses, its guild-halls, its ancient hospitals for the poor—for even the poor in those days were lodged in beautiful buildings, witness Ford's Hospital—the houses of the citizens. And all these places were filled with examples of every form of craftsmanship, which, if they had been preserved till to-day, would be worth a king's ransom—painted glass, woven fabrics, metal work of every kind in silver, in brass, in pewter and in iron, furniture and what not besides. What is still preserved in your churches and in this glorious Guildhall in which we are assembled to-day—one of the most beautiful of our English civic buildings, with its rich remains of glass and tapestry and furniture—what is left is enough to help us to understand what Coventry was like in the ancient times, when the buildings and the furniture and the dress of the citizens were all in harmony and full of richness, colour, and that all-round beauty and fitness which is so sadly missing from our modern life.

Even at the beginning of the nineteenth century Coventry must still have been a beautiful place; the richness of the mediæval colour had disappeared, but much of the old quaintness still remained. Here and there, of course, many of the older buildings were in existence, but the general appearance of the city would be that of the eighteenth century, with that note of correctness and good taste which some among the public during the last few years have learned to appreciate at its true value. But the whole effect would be harmonious without any of those incongruities and lapses into vulgarity which seem impossible to avoid in modern work, and which make the towns of to-day places which the artist and the man who loves beauty and orderliness turn from with dismay. During the last century in all industrial areas the old towns have suffered, and Coventry more than most. Its growth has been so rapid, and the requirements of its captains of industry have been so insistent, that nothing in the shape of old-world beauty has been allowed to remain if it stood in the way of commercial enterprise. I am not complaining, and I am glad to congratulate the people of Coventry on their success and prosperity, which has carried the fame of their productions to the ends of the earth. Doubtless the whole body of citizens has benefited, but I cannot help feeling—and I am sure I am voicing the opinion of the majority of my audience—when I say, "These ought ye to have done and not to leave the other undone." During the last twenty years the work of destruction has been going on with ever-increasing haste, and it is to save, where possible, what is left that the Coventry City Guild has been formed. Unfortunately, the war has to an extent interfered with its work, but much good has been done, and its members mean to do much more in the future. There is much that is left that is worth keeping, and the Guild will do all in its power to save what is worth preserving from the hand of the despoiler.

Much of the work will be of an educational character. It is not that people are wilfully malicious, but because they do not realise the value of the things they destroy or disfigure. A tradesman finds his business growing and he wants more window space to display his goods. His business premises were once the residence of a substantial citizen who had adorned the front with columns in the Grecian style. The builder is called in and a great gash is made in the front. The bases and columns—at least up to the first floor—are mercilessly hacked away, the capitals and upper part of the order are allowed to remain, but having been amputated at the extremities they must be supported in some way, and so a steel girder is artfully inserted and concealed by a dressing of stucco. It is a wicked thing to do, but the perpetrator of the evil deed is a good citizen and sleeps o' nights with an easy conscience. The Coventry City Guild must show him a better way.

Look at the way in which Palace Yard has been destroyed. Once it was a place of quiet beauty—a relic of the past, of which the city might well have been proud—a place that had entertained princes. To-day, it is a place of desolation and a sample that all may examine of the want of respect which we of this generation have shown to the works which our fathers wrought. They rest from their labours and we disfigure and destroy their works.

I place a high value as educational work on the articles which Miss Mary Dormer Harris has been contributing to the Coventry Press on old Coventry houses. But even articles like these, useful as they are in stimulating interest in what is left of the past, have a danger which Miss Harris herself has recognized. She discovers and describes a fine old panelled room or a Georgian fireplace or staircase, and she confided to me the other day that she was afraid the dealers, who know the value of these things if the people of Coventry do not, might now have

their attention called to the discovery and offer a price that seems worth while to the owner, and the panelling or other architectural feature made by Coventry craftsmen would be torn out of its old position and built into a new room in London or the provinces.

The idea of a museum is all right as far as it goes, but we ought to preserve as much as we are able of the old work in its present environment. If there is no other way of saving a piece of beautiful old work than by removing it to a museum, by all means do so, if only as a reproach to the despoiler, and it may have the good effect, too, of silently preaching a sermon. Visitors to your museum will in time see the difference between what the modern system of production compels them to accept and the kind of thing that in the old days was universal, and they may in time find out what is wrong in our modern methods, and by degrees the body of opinion that is dissatisfied will become powerful enough to get things altered. May I conclude by making what I believe are practical suggestions? Side by side with your guild for the preservation of the old, could you not foster a guild of handicraft which should try and take up the old tradition of sound craftsmanship and design that was destroyed as a result of the factory system? If this were done, you would have a positive programme that would in time produce perhaps a partial revival of the arts and crafts that would be at least a protest against the vulgarity and insincerity of the present machine-made art.

Then, again, when are you in Coventry going to take advantage of the powers that were given to all local authorities by the Town Planning Act of 1909? I know the difficulties, but I am of opinion that if such an Act had been in operation fifty years ago and had been wisely administered, much that we deplore in our great industrial towns would not exist to-day. The remedying of the congestion of traffic in the centre of the city threatens some of the interesting old street frontages which many would like to be preserved. I am of opinion that if you were to adopt the Town Planning clauses of the 1909 Act, and prepare a town plan, then, by a system of ring and radial roads, the traffic in the centre could be so reduced as to make it possible for you still to retain many of the narrow streets and the quaint frontages which tell the story of the historic development of the city, when the city walls restricted the widths of the streets inside.

If you had a town plan, you could at least arrange for the orderly development of the city and prevent things from happening in the future that we all deplore in the past. I hope, Mr. Mayor, you will not imagine for one moment that I am lecturing the City Council on their duties, I am only expressing my own opinion; but as one who has taken a great interest in town planning and civic design, I do not quite understand why Coventry, which is growing perhaps faster than any town in England, has not taken advantage of this Act, which would not only make it possible to remedy many of the mistakes of the past, but control future developments, and prevent worse things from happening in the future.

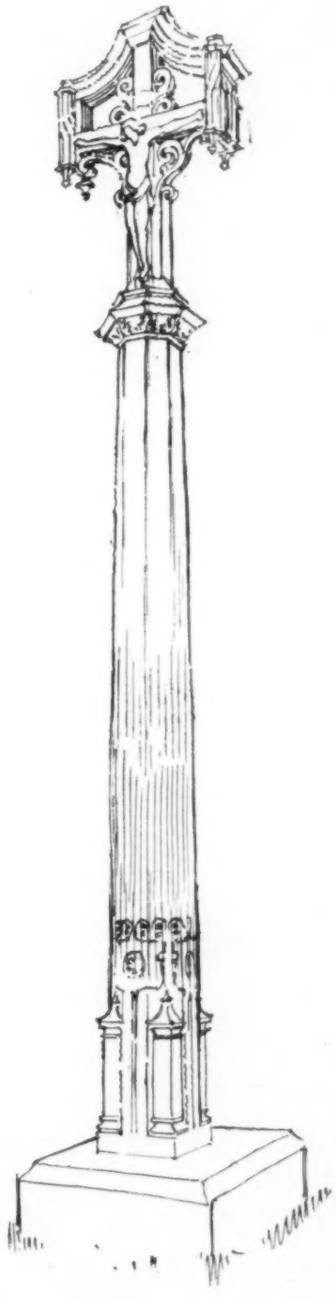
You are making heaps of money in Coventry; do not let the people whose chief concern is the production of riches have their way too much and destroy your wealth. You might, perhaps, demand something from them in the nature of ransom for the past and use it as a fund for saving what is left.

Housing Scheme, Coventry.

The Coventry Freemen recently considered a development of their estates which would afford land for 2,493 houses, capable of housing 10,000 or 11,000 persons. Main roads are proposed linking up the old Allesley-road with the Birmingham-road, Coundon, and Radford. It was decided that the surveyor to the trustees should consult with the City Engineer as to the town-planning of the area.

A CHURCHYARD CROSS.

That Gothic design is not necessarily a thing of spikes and flourishes, but may hold its own in a measure of dignified reticence with even the dullest of classic compositions, our illustration of the churchyard cross at Leasingham, by Mr. A. H. Skipworth, may well show. This is very happy in its proportion and emphasis.



Churchyard Cross
Leasingham nr Sleaford
A. H. Skipworth
Architect

THE BRITISH STEEL INDUSTRY.

Sir William Beardmore presided last week at the autumn meeting of the Iron and Steel Institute, held at the Institution of Civil Engineers.

The mechanical section of the committee dealing with the treatment of steel and its ferro-alloys submitted a preliminary report on the comparison of rolling-mill practice at home and abroad, and replies to questions sent out to ascertain the views of manufacturers on the causes of the smaller output of British steel works as compared with foreign practice. In their general remarks on the replies the committee stated:—

"The opinion is expressed that if the steel trade of Britain is to hold its own in open competition with the other steel-producing countries of the world, it will be necessary, amongst other changes, to have a Central Board to which all orders will go, and from whence the work will be allocated to the different works according to their ability to do it. This would save the enormous amount of capital at present locked up in stocks of rolls. Many works have rolls for practically all the British standard sections, and change the rolls as required to suit orders. If, on the other hand, the orders were sent from a Central Board, mills could be kept on the work allocated to them for long periods, thus reducing the amount of roll-changing and also the cost of production. It would also enable works to roll only such material for which their mills and plant are best adapted. It is clear to the committee that the one outstanding feature which has been revealed by their work, so far as it has gone, has been the eliciting of the almost unanimous opinion that if the steel industry in this country is going to maintain its position, it must be by some great broadening of our commercial organizations that would lead to economies far and away outweighing any other element in the situation, and long ago realized and adopted by our foreign competitors."

LONDON COUNTY COUNCIL SCHOOL OF BUILDING.

The success of the course of lectures on "The Buildings of Italy," delivered on Tuesday evenings at this school, Ferndale-road, Clapham, S.W., in April and May last, by Professor Beresford Pite, F.R.I.B.A., has encouraged the Council to arrange a further series for the Michaelmas (1917) and Easter (1918) terms. The lectures will be known by the general title of "Town Planning and Architectural History," but new and more comprehensive matter will be introduced as the course develops; whilst additional facilities for students will be provided as their requirements are ascertained. The Council again grants the special privilege of free admittance to teachers in its service, and they will find the series of considerable advantage to them. The opening lecture was delivered on Tuesday, at 7.30 o'clock p.m.

Belfast Cathedral.

Mr. P. Macgregor Chalmers, the newly appointed architect for Belfast Cathedral, has, it is stated, submitted drawings for the consideration of the Cathedral Board. Several striking and effective changes have been introduced into the original plans of Sir Thomas Drew. The new plan shows an eight-sided central tower instead of the square tower. The front of the Cathedral is represented by a porch in the centre with two great square towers at either side. The organ will be placed in the south transept. Underneath the organ loft will be a chapel useful for daily services. In the other transept will be a larger chapel

GENERAL NEWS.

Housing of the Working Classes.

An important proposal has been made to the R.I.B.A. by the Local Government Board in connection with the scheme for the housing of the working classes. This involves the grant of a sum of money for the purpose of obtaining, under the direction of the R.I.B.A., the best plans for working-class houses, and a committee is now considering the details of the proposal, in the carrying out of which it is hoped to secure the co-operation of the Allied Societies.

Housing Exhibition, Sunderland.

An exhibition was opened on Monday in the Sunderland Art Gallery of over 300 plans, sketches and photographs illustrating town planning, garden cities and model dwellings. The exhibits are on loan from authorities of the following places:—Letchworth; Port Sunlight, Bournville; Harborne, Birmingham; Earswick, York; Walkerville, Newcastle; Hull; Dundee; Hampstead; Ruislip Manor, Middlesex; Rhubina, Cardiff; Woodlands, Doncaster; Sutton, Surrey; Fernville Park, Leeds; Liverpool; Ealing; Gidea Park, Romford; Rosyth; Well Hall, Woolwich, per H.M. Office of Works; and recent new munition townships.

Tenements and Single Rooms, Scotland.

At the annual Congress of the Incorporated Sanitary Association of Scotland, held in the Masonic Hall, West Regent-street, Glasgow, Mr. Peter Fyfe, Chief Sanitary Inspector, Glasgow, dealt with the question, "What is the minimum accommodation which should be provided for working men with a wife and children?" The single-apartment house, he said, should be abolished. No future house for a family should be erected without the domestic facilities of a private w.c., a scullery with hot water, a well-ventilated larder, and a store closet; and no future house of less than three apartments should be permitted to be let to any tenant with a family in which both sexes were represented.

Overcrowding in Bethnal Green.

At St. Martin's-in-the-Fields recently Mr. Douglas Eyre, of Oxford House, Bethnal Green, said that four million of our fellow-creatures in this country were living in overcrowded conditions. In London 3,000 people were living eight to a room; 7,000 seven to a room; and 26,000 six to a room. Of London's population 20 per cent. at least lived under lamentable conditions. The country needed 500,000 new houses to replace those that were insanitary, 300,000 to overtake the deficiency in building of the last seven years, and 700,000 to provide for the increase in population. This was equivalent to the erection of 1,500,000 tenements, or 7,500,000 new rooms. In Bethnal Green 40,000 out of the population of 130,000 were living under insanitary and overcrowded conditions. The borough possessed five condemned areas, of which Brady-street had a population of 470 per acre. A legal standard of housing accommodation was required.

Trade Scholarships for Boys, 1918.

The London County Council offers about 260 trade scholarships to boys between the ages of twelve and a-half and sixteen years, whose parents are resident in London. The scholarships provide free education (with maintenance grants ranging from £6 to £15 a year), for one, two, or, in certain cases, three years at trade schools approved by the Council. The instruction provided at these schools is designed to enable boys on leaving school to take up either apprenticeships or employment in skilled trades. Instruction is given in motor body building, the engineering and allied trades, building trades, furniture and woodwork trades, book production, silversmithing, photo-engraving and photo-process work, &c. Application forms (T.2/258) and full particulars of the scholarships may be obtained from the Education Officer (T.2), L.C.C. Education Offices, Victoria Embankment, W.C.2, to whom all applications must be forwarded not later than Saturday, October 13th, 1917.

Sheffield Housing.

The Sheffield Federated Health Association has had under consideration the scarcity of housing in the city, and is taking steps to stimulate public opinion in support of the building schemes which the Corporation is prepared to put in hand as soon as peace is declared. The Association has issued a pamphlet on the housing question. It shows that whereas the number of houses demolished in the ten years ending 1914 was 511, the number in the subsequent three years has been 936; while the number of houses erected has steadily fallen from 1,904 in the year 1906 to 397 in 1916. For some time ordinary speculative building has been practically stopped. No provision is being made for the city's yearly increase of population, which before the war was estimated at 5,254, but has since been above the normal; consequently there is an absolute dearth of empty houses. There are about 16,000 back-to-back houses in Sheffield.

Housing after the War.

At a meeting of the Southend Town Council on Tuesday the receipt of a letter from the Local Government Board was reported on the provision of houses for the working classes at the conclusion of the war. It pointed out that the Government recognises that it will be necessary to afford substantial financial assistance from public funds to local authorities who are prepared to carry through, without delay, at the conclusion of the war, a programme of housing for the working classes which is approved by the Board. It stated that if the local authority is of opinion that there is a housing need in its area and desires to share in the financial assistance referred to, it should submit to the Board particulars of proposals and other information. The Borough Surveyor has been instructed to report generally on the subject, dealing particularly with the necessity which exists for the erection of suitable houses for the working classes. The Bristol Health Committee recommends the erection by the Corporation of 2,000 houses after the war, the Government promising substantial aid.

Halifax Municipal Housing.

An interesting development in the question of municipal housing at Halifax is a decision of the Housing Sub-Committee that their scheme for the erection after the war of eighty-six houses shall be submitted to the Local Government Board as the first instalment of a scheme for 500 houses. The whole matter, however, depends a good deal on the attitude the central authority adopts towards housing schemes, it being very definitely understood among members of the Halifax Corporation that their proposals will be proceeded with only if substantial financial assistance is forthcoming from the Government. The type of house suggested at Halifax contains a large living room, a scullery with bath, and three bedrooms. There will be no cellars, but adequate conveniences will be provided in back yards. Wherever possible the houses will be given a south aspect. On this side, too, there will be a large garden. The estimated cost, including land, is £320 per house.—*Yorkshire Observer.*

Edinburgh Town Planning Schemes.

Several matters which have engaged the attention of the Town Planning Committee of Edinburgh Town Council have been advanced a stage. On a representation, the Committee decided to recommend to the Council that Granton area should be made the subject of a town planning scheme. The Committee considered the latest proposals in connection with the Craigentinny area, and instructed a communication to be opened up with the owners with the view of completing the draft scheme. With regard to the Bellevue area, it was agreed to ask the owners to send in their report on the draft scheme which had been submitted to them. Some conversation took place on the action of the Local Government Board with reference to Abercorn area, in connection with which steps were taken two and a half years ago. An inquiry was held in the beginning of this year, but no report had been received.

Regulations for Technical Schools, &c., in England and Wales for the School Year 1917-18.

We have received the following circular which has been issued by the Board of Education to Local Education Authorities and Managers of Technical Schools, Schools of Art, &c.:—

1. Subject to the alterations mentioned below, the Board of Education have decided to continue in force for the school year 1917–18 Parts I, II, III and V of their Regulations for Technical Schools, &c., in England and Wales [Cd. 7996]. Part IV of the Regulations (Special Regulations for Grants in Aid of Instruction for Men serving with the Colours) was withdrawn by Circular 961, dated 11th August, 1916.

2. The following alterations will come into force as from 1st August, 1917:—

(i) *Preliminary Article.*—Institutions providing instruction in Preparation for a Trade for Students formerly in attendance at Special Schools will in future be aided under the new Regulations for such Institutions [Cd. 8505], and will not therefore receive grants under the Regulations for Technical Schools, &c. The following words are accordingly added to paragraph (*a*):—

> "or in respect of Courses recognised under the Regulations for Institutions providing Instruction in Preparation for a Trade for Students formerly in attendance at Special Schools."

(ii) *Article* 42.—There are a few Schools of the Junior Technical School or Nautical School type at present recognised under this Article, which owing to the exigencies of the war, have been unable to conform to the appropriate Regulations. The Board propose for the present to continue to recognise these Schools under this Article, and the second sentence of paragraph (*c*) is accordingly altered to read as follows:—

> "Any Schools of those types which are now recognised under this Article may continue to be so recognised, if the Managers desire, until 31st July, 1918."

OBITUARY.

Captain C. F. Bower.

Official intimation has been received of the death in action, on the 13th inst., of Captain Charles F. Bower, youngest son of Mr. James G. Bower of Earlham House, Norwich. Born on July 29, 1891, he was 26 years of age. Having been educated at Norwich Grammar School, and taken the Parker Exhibition, he went to Corpus Christi, Cambridge, where he graduated with honours in history in June, 1913. He remained at the Cambridge Engineering School till the following Christmas, when he returned to Norwich and joined the staff of the Norfolk Iron Works (Messrs. Barnards, Ltd.), of which his father is chairman and managing director. In June, 1915, he entered an officers' training school and in due course was gazetted to a commission. He almost immediately proceeded to France. Captain Bower was a brilliant student, with unusual gifts in the way of engineering. Outside of his professional work he was best known by reason of his interest in the Boy Scout movement. He was one of the pioneers of it in Norwich. At the time of his death he was still holding office as master of the 1st Norwich Boy Scouts, of whom his father is President.

Mr. Richard Kerrison.

The death is announced of Mr. Richard Kerrison, builder and contractor, of Southwick. The deceased gentleman, who was aged 68 years, was a native of Norfolk, who went to Southwick in 1872 to work for the late Mr. James Armitage, builder and contractor. He afterwards became shop foreman, and later manager, a position he held for many years. Seven years ago Mr. Kerrison commenced business himself as a builder and contractor, and since then had done much work for the North-Eastern Railway Company and the Durham County Education Authority. He was a member of the Master Builders' Association.

CORRESPONDENCE.

The Pitfalls of Arbitration.

SIR,—I have read with great interest the letter from Messrs. Carpenter, of Leicester, under the above heading in your issue of August 24 last.

Their careful statement of the facts of the case in which they were concerned gives food for reflection, and their example of the drawbacks of arbitration from the builders' point of view is by no means an isolated one. During the past fifteen years I have been professionally concerned in arbitration proceedings arising out of building contract disputes all over the country, and I think that the result of my experience may be of value to your readers. As all, or most of them, will be aware, where, in building trade disputes, an architect or surveyor is appointed as arbitrator, he is either (1) some specified man selected by the parties at the time the contract is entered into or after the dispute has arisen, or (2) some architect or surveyor selected by the President of the R.I.B.A. under the provisions of the R.I.B.A. or "National" form of contract.

In case No. 1 it seems to me the builder (who submits himself to the arbitration of an architect) has the matter to a certain extent in his own hands. In case No. 2 he simply embarks on a gamble. There are in London and the provinces a large number of architects and surveyors who are perfectly qualified to act as arbitrator, that is to say, men skilled in their profession who have taken the trouble to acquire a knowledge of the duties of the office and have sufficient moral courage to carry them out and who can take a judicial and impartial view of the cases presented to them. On the other hand, there are architects and surveyors who are quite unfitted to perform the duties of arbitrator, and who seem to embark on a reference with a pre-conceived notion that their primary duty is to "save the face" of the architect on the job at all hazards, and if this can only be done at the expense of the builder, then so much the worse for the latter. My view is that the R.I.B.A. is largely to blame for so many unsatisfactory arbitrations. If that body were to form a rota of architects and surveyors to act as arbitrators and take care that only men were placed on the rota who could give satisfactory proof that they had a competent knowledge of the rules of evidence and how to conduct a judicial enquiry, as well as the other qualifications of professional skill and high character, it would tend to give the confidence which does not exist in the building trade in arbitration as the best tribunal for the settlement of trade differences. My own opinion is that the ideal forum would be a court of three arbitrators consisting of an architect or surveyor, a building contractor and a lawyer with some knowledge of the trade—this is the kind of tribunal which merchants and shipping people usually call in to adjudicate on charter-party disputes and the like. Instead, however, of the R.I.B.A. having a panel of expert arbitrators what happens is that the President, when called upon to nominate, too often selects some architect whose only qualification appears to be that he is the president or past president of some local branch of the R.I.B.A., which in most cases simply means that the man selected has been in practice a certain number of years without having come a serious "cropper."

How this often works out in practice I can best illustrate by giving the outline of two cases in which I was concerned within recent years. In the first case, a dispute involving a claim for something like £1,500 by a builder for balance of contract price and extras, with a counter-claim by the employers for £200 penalties, was sent by the then President of the R.I.B.A. before an architect as arbitrator whom, I should think, the President can have known nothing whatever about. The architect selected was a past president of a provincial branch of the R.I.B.A., and I can best describe him as—a 'weakling." I do not for one moment suggest that this man was not desirous of acting fairly, but he was simply *incapable* of doing so. He succeeded in dragging out the proceedings (which might have been easily concluded in six weeks by an arbitrator who knew his job) for eighteen months—part of the time wasted being attributable to his inability to understand any point until it had been put to him about six times over, and part to the fact that between the various appointments most of what he had heard before was effaced from his memory. This was bad enough; but in addition, between the formal hearings, as I accidentally discovered, he was writing to and receiving letters on the subject matters in dispute of an *ex parte* character from the architects on the other side, behind the backs of my builder client and myself, the issue, as frequently happens in these cases, being largely as to whether the builder or the architects were responsible for certain defects and deviations. The award in this case was in favour of the builder for about £800 on the claim and dismissing the counter-claim and, so far, the builder may be considered lucky, though he got far less than he ought to have got. Then followed the order that each party bear his own costs and that the arbitrator's fees (£400) be borne equally between them. The next case was a claim for about £500 by a builder, which was sent by the then President of the R.I.B.A. to be arbitrated upon by the president of a local branch. This case was decided after four sittings, and the builder was awarded £300 with the order that each party bear his own costs and the builder pay the arbitrator's fees amounting to £96! I could tell of other similar cases if I had not some regard for your space, and I could also tell of cases where the right kind of architect arbitrator has given my clients much less than they claimed, but has tried the case carefully, impartially and in accordance with judicial method, and, in my opinion, come to a fair decision. In the main, however, I am persuaded that the present method of arbitrating in building disputes leads far too often to denials and miscarriages of justice, and, as I have indicated, the remedy for this is largely in the hands of the R.I.B.A.

W. H. HOPE,
Solicitor and Secretary of the Northern Counties Federation of B.T.E

Sunderland.

P.S.—Since the above was written I have seen the letter from Mr. Max Clarke, F.R.I.B.A., in your issue for September 14. The tone of this letter serves admirably as an illustration of the frame of mind unconsciously, no doubt, adopted by too many architects in relation to arbitration.

W. H. H.

Privileged Fashions.

SIR,—Dame Dora is evidently a lady of fashion. This morning we have the following announcement:—

"*Promenade des toilettes* and exhibition of Autumn fashions by living models will be held to-morrow (Tuesday) and Wednesday. The Parade will take place from 3 to 4 and from 4.30 to 5.30 each afternoon, and no tickets of admission will be issued or required."

The Defence of the Realm Act was added to the Statute Book in November, 1914, and, with amending Acts, is still the law of the land. Under these Acts, regulations and orders innumerable have been made with the ultimate object that the full strength of the country shall be devoted to the prosecution of the war. In the spheres of architecture and engineering we are restricted to a minimum of expenditure on labour and materials in every class of work, not only in the matter of new undertakings, but in repairs and overhaulings.

It is easy enough for our loyalty to understand that such restrictions are in the interest of our national security, but it is not easy to understand why the exploitation of fashions should be encouraged by the omission of any order that would make the above-quoted advertisement an equal offence against the Defence of the Realm. So long as such promenades are immune from the operations of the Acts, we need hardly trouble to do more than wonder whether those who organise them, and those who take part in them, remember that we have entered upon the fourth year of a war of which we cannot yet see the end.

TWO ARCHITECTS.

A Windsor Estate for Sale.

The St. Leonard's-hill estate, Windsor, has been placed by the late Sir Francis Barry's trustees in the hands of Messrs. Curtis & Henson for sale by private treaty. Six counties are visible from the property, which was originally part of Windsor Forest. Its area is about 535 acres, and the views include Windsor Castle. The park of 230 acres contains some of the finest ornamental timber in the country.

IN HONOVR OF
THE NOBLE ACTS
OF THREE OLD BOYS IN SOVTH AFRICA
ALFRED BARTON KINSEY
WHO RESCUED AND LOST HIS LIFE IN A BRAVE ATTEMPT TO SAVE A FRIEND
AT THE SCHOOL 1874
DIED 1894
THOMAS PAXTON
WHO RISKED HIS LIFE TO SAVE A SCHOOLFELLOW
AT THE SCHOOL 1874
DIED 1895
ROBERT SPENCER PAXTON
AT THE SCHOOL 1874
DIED 1897
VINCIT : QVI : PATITVR

A Memorial Tablet
By Gilbert Marks

[This is a good instance of a decorative panel without any definite architectural style in detail.

Leading Contents.

	PAGE.
HEATING AND VENTILATION	177
NOTES	178
THE RECONSTRUCTION OF ROADS AFTER THE WAR	179
THE PROPOSED NATIONAL WAR MUSEUM	179
OVERCROWDING IN EDINBURGH	179
THE ANTIQUITIES OF COVENTRY	180
GENERAL NEWS	182
CORRESPONDENCE	183
LIGHTING, HEATING AND VENTILATION :—	
THE HEATING OF BUILDINGS	185
WOOD FIRES	186
HOW THE WAR HAS INCREASED THE USE OF GAS	187
NEW GOVERNMENT CONTRACTS	190
THE TRADES' TRAINING SCHOOLS	192
THE NEW TOWN OF ROSYTH	192
THE LONDON ASSOCIATION OF MASTER DECORATORS	193
COMPETITIONS, CONTRACTS, &c.	194

ILLUSTRATIONS.

WE give this week illustrations of the headquarters of the Theosophical Society, Tavistock-square, W.C., by Mr. E. L. Lutyens, A.R.A., including a drawing by Mr. Walcot.

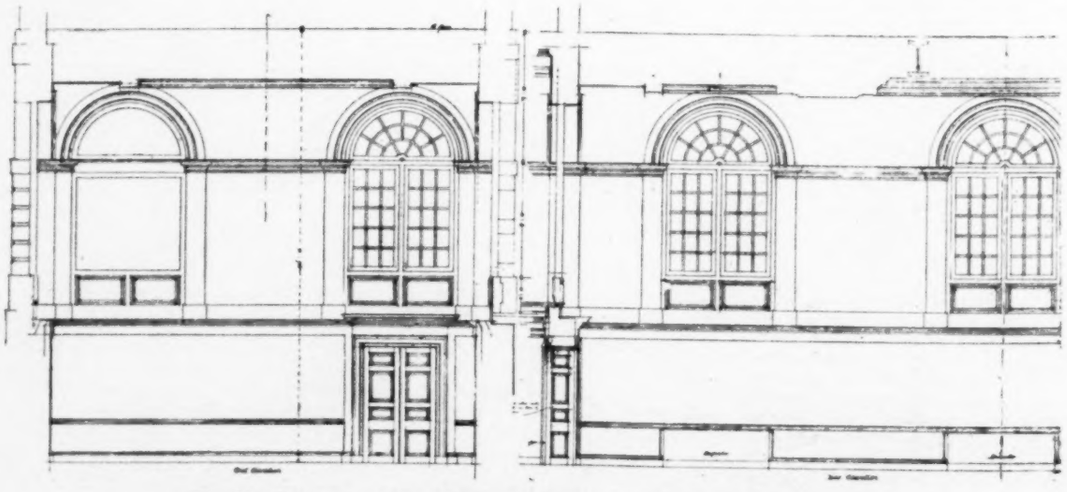
Munster and Leinster Bank, Cork.

We illustrate in the present number some views of the new head offices of the Munster and Leinster Bank, which appeared at this year's exhibition of the Royal Academy. Owing to the importance of maintaining the business of the bank during alterations, the new office was placed on an entirely new site, which required the building of the front in two sections, while some difficulties in foundation were successfully dealt with. The central part of the banking hall is used by the public, and the work of the staff is carried round a circular range of offices beyond the central line of pillars, and extending between them on the two sides. A gallery on three sides serves to connect the board room, manager's and secretaries' offices, &c., on the first floor.

The principal contractors were Messrs. John Sisk & Son, Cork; marble work by Farmer & Brindley; and the Galway green marble counter front was carried out by Mr. J. J. O'Connell, Cork. The heating was in charge of Messrs. Musgrave, Belfast; bronze counter fittings by Messrs. Singer & Sons, and the strong rooms were fitted up by Messrs. Chatwood's Patent Safety & Lock Co.

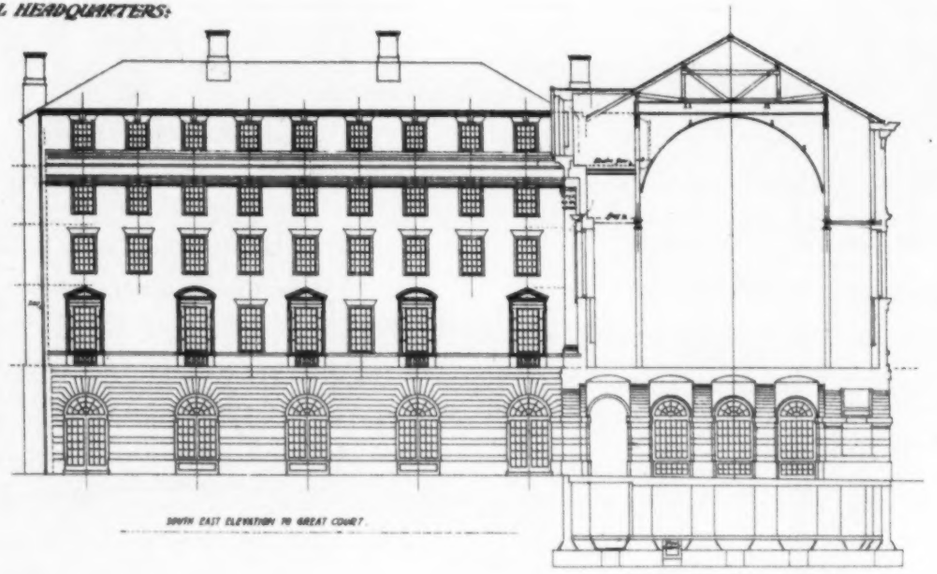
The architects were Messrs. Arthur & Lieutenant H. H. Hill, Cork.

[THIS sketch is from Mr. Percy G. Stone's admirable design for a Queen Victoria Memorial in the Isle of Wight, and the drawing was made because of a certain quaint elegance which the design possesses in its picturesque and telling outline.]



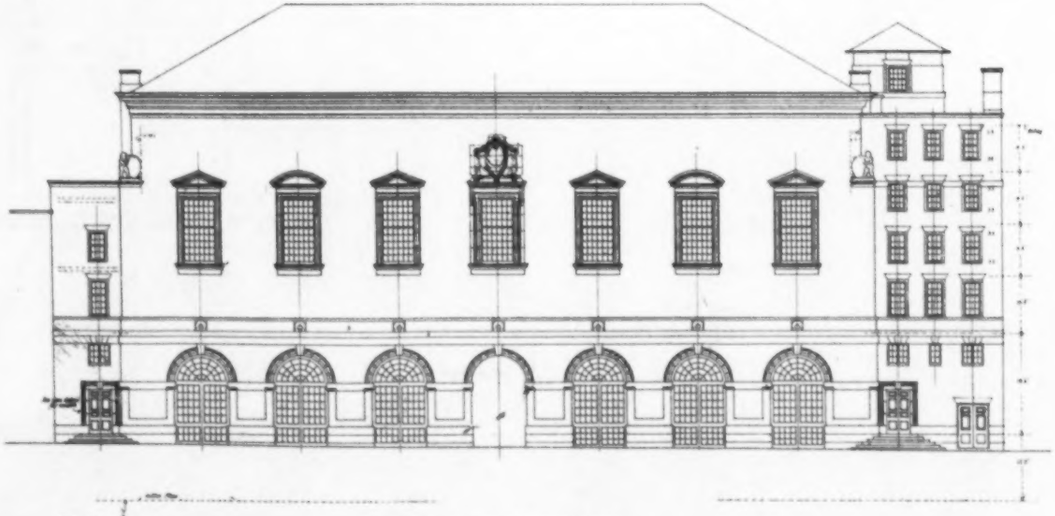
The Headquarters of the Theosophical Society, Tavistock Square, W.C.
MR. E. L. LUTYENS, A.R.A., F.R.I.B.A., Architect.

THE THEOSOPHICAL HEADQUARTERS:



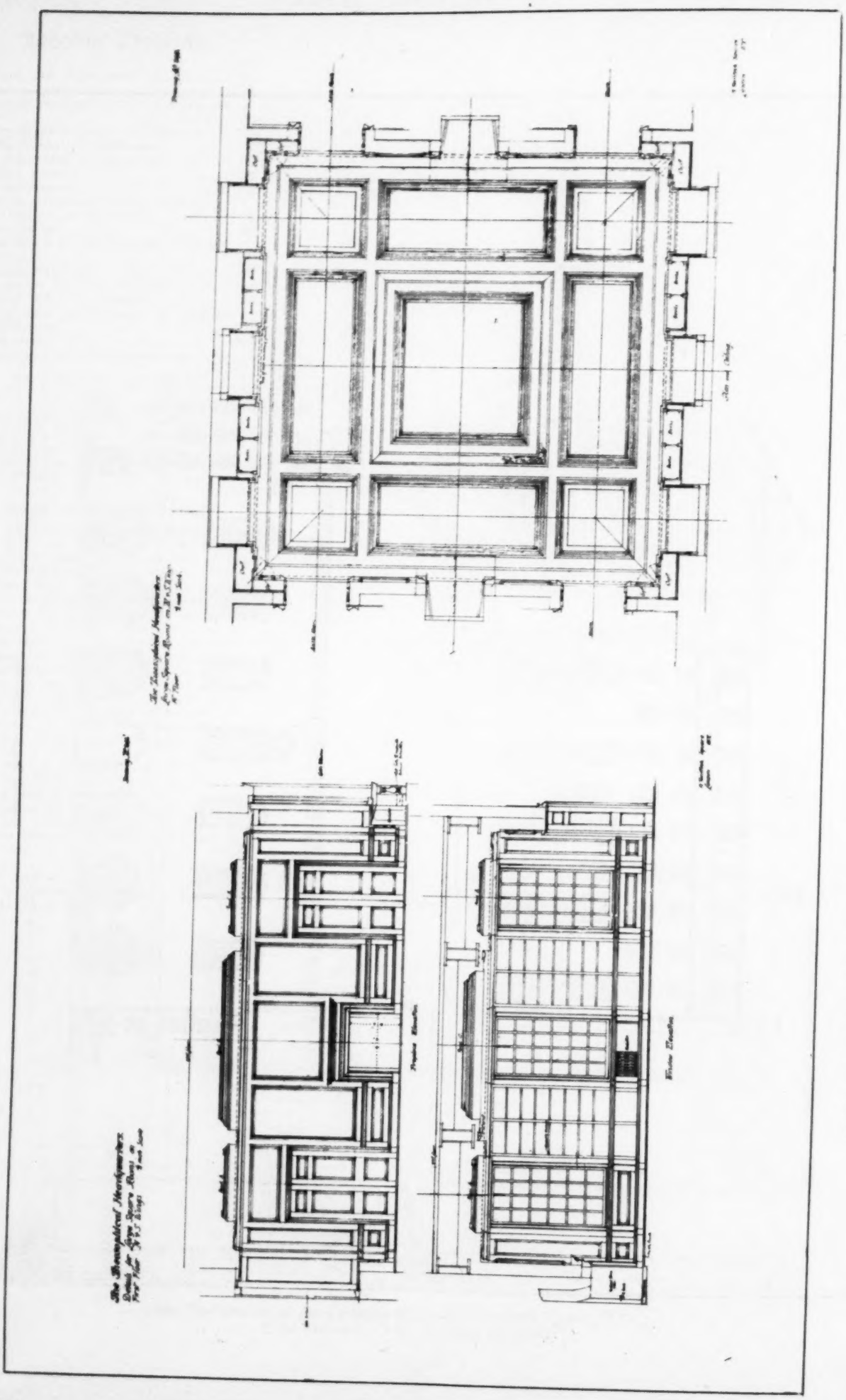
SOUTH EAST ELEVATION TO GREAT COURT.

CROSS SECTION THROUGH MAIN HALL.



NORTH EAST ELEVATION TO BURTON STREET.

THE HEADQUARTERS OF THE THEOSOPHICAL SOCIETY, TAVISTOCK SQUARE, W.C.—MR. E. L. LUTYENS, A.R.A., F.R.I.B.A., ARCHITECT.



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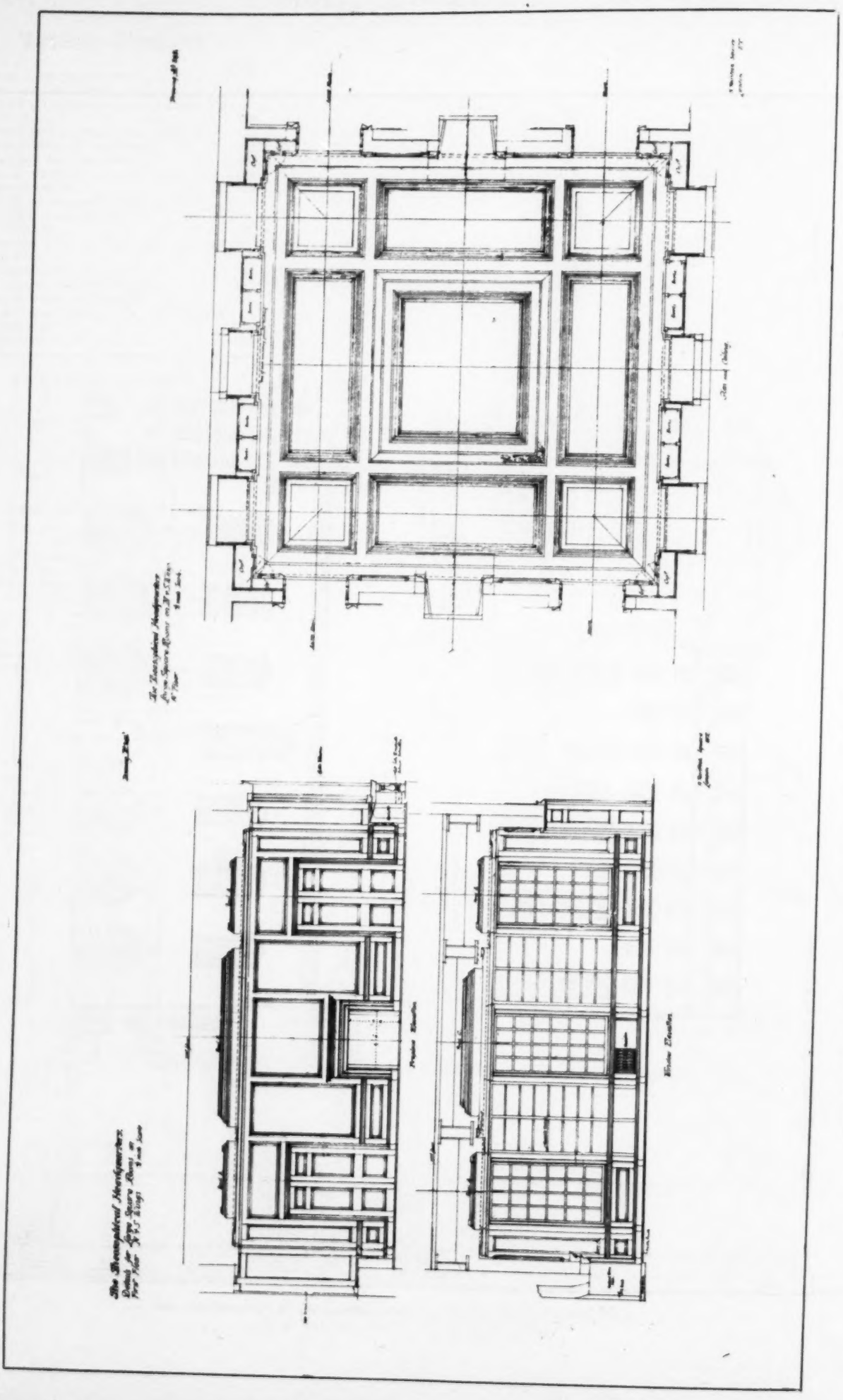

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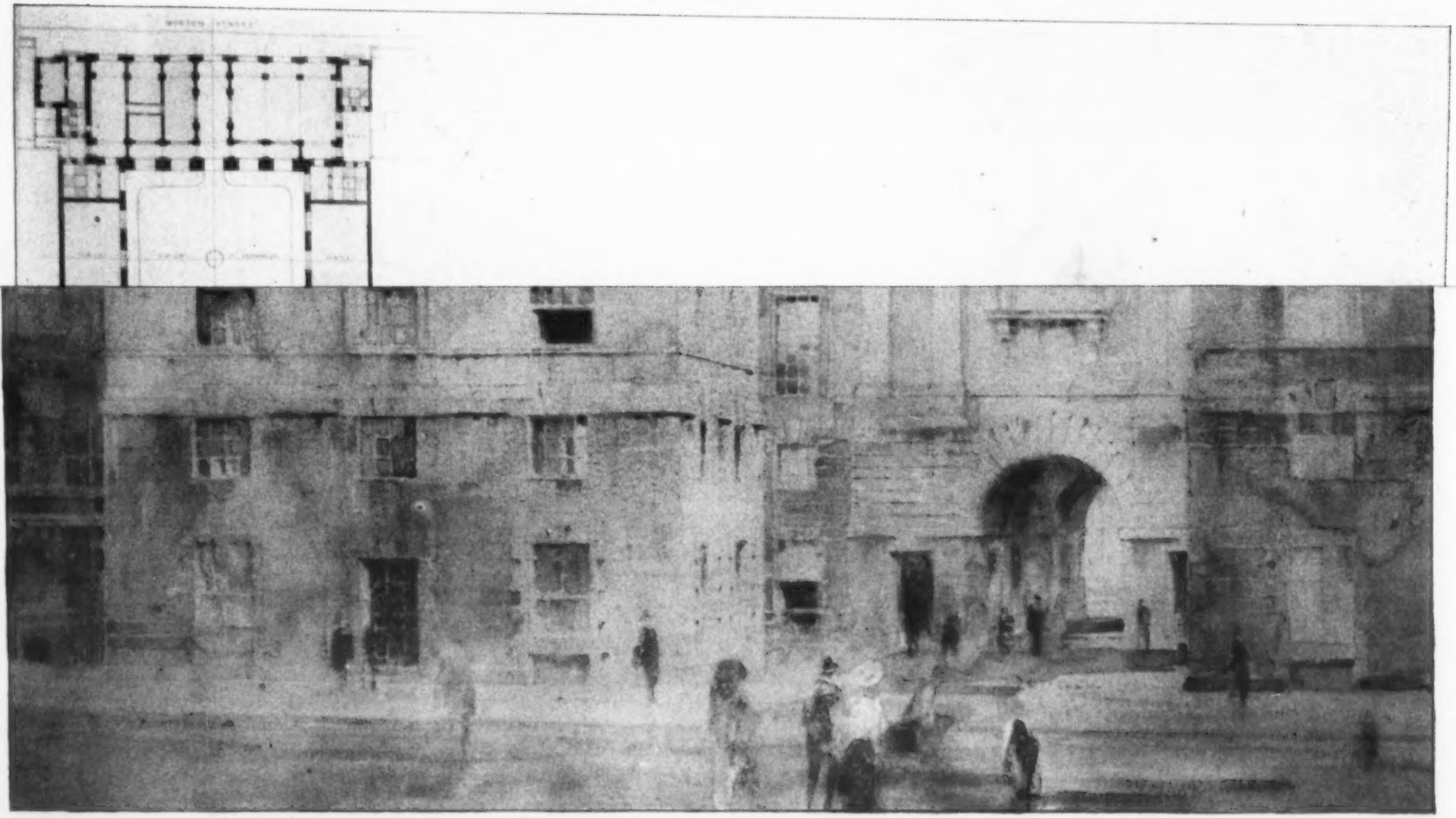

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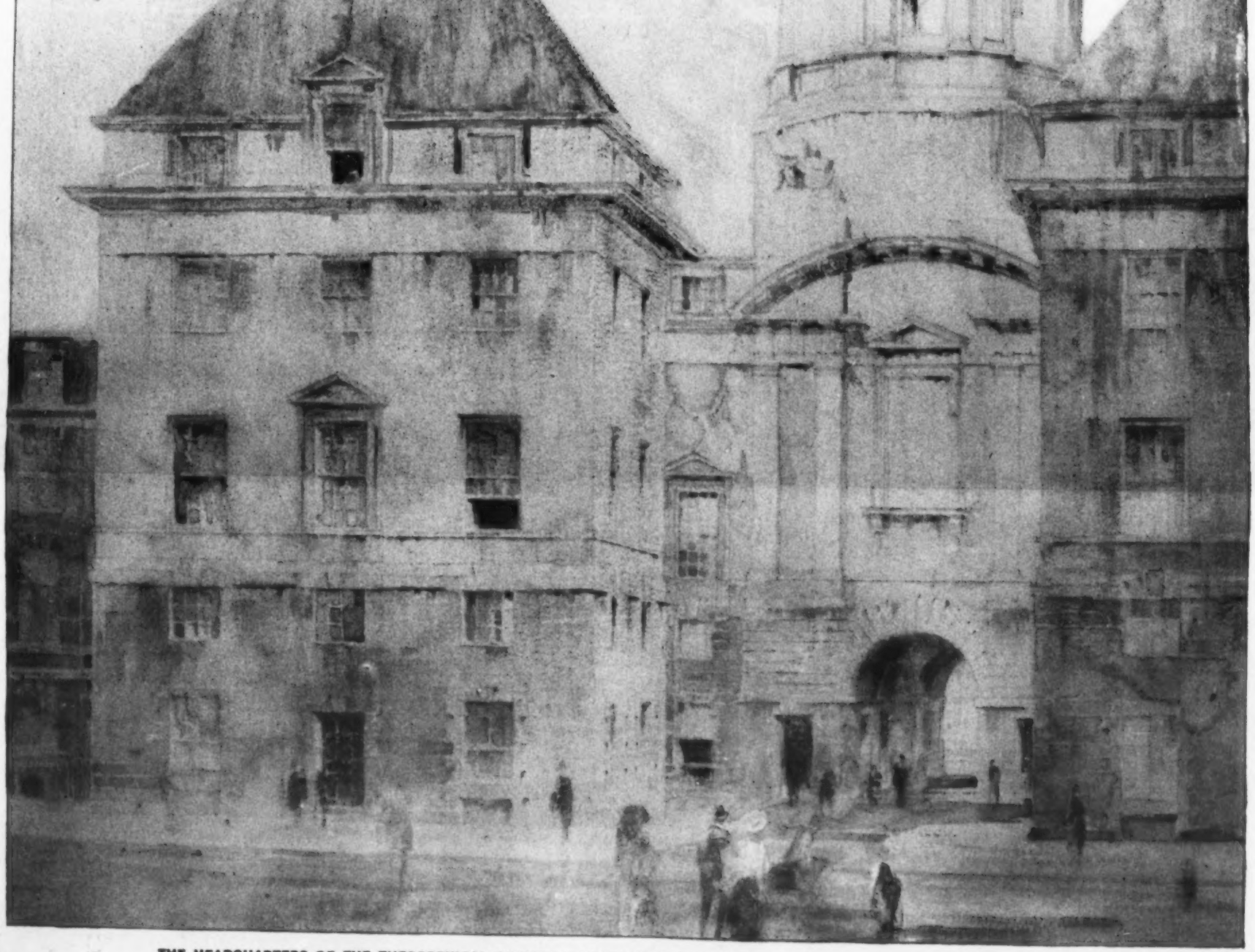

THE HEADQUARTERS OF THE THEOSOPHICAL SOCIETY, TAVISTOCK SQUARE, W.C.—MR. E. L. LUTYENS, A.R.A., F.R.I.B.A., ARCHITECT.

LIGHTING, HEATING AND VENTILATION.

THE HEATING OF BUILDINGS.

THE waning of the year, bringing with it the intimation that the chill days of autumn are upon us, makes the subject of artificial warmth a not unpleasing one, while in these strenuous times of more costly and restricted sources of heat energy, some review of the methods available for heating our buildings, though this must necessarily cover well-trodden ground, is desirable. Heat is vibration, not the visible vibration of a body moving as a whole, but the internal vibration of its minute ultimate particles or molecules; the essence of life is in these movements, and molecular rest is absolute cold and complete death. All bodies contain some heat, even liquid air contains a little, and the human body requires for efficient maintenance a heat level which must be provided artificially during the greater part of the year in this country, and which shows very little difference for healthy individuals.

To provide this heat level or temperature an amount of fuel is necessary which depends, of course, on the number of persons to be warmed and the space they occupy, but also upon the efficiency of the apparatus in which the fuel, be it coal, oil, gas or other material, is burnt. Thus the amount of heat energy to be provided, in other words the price to be paid, will depend on the space to be heated and the temperature desired. The day is yet to come, and it may not be really so far distant, when heat will be sold in units like electricity, which will much simplify calculations and comparisons, and the unit adopted will presumably be some multiple of the B.T.U., the British thermal unit, which is the amount of heat, as assessed by fuel consumption or other absorption of energy, required to raise 1 lb. of water through 1 degree Fahrenheit. This will be the era of the central heating system when municipal authorities will supply by heat meter the exact amount of energy the consumer desires to pay for. In the meantime we are a law unto ourselves, only agreeing on the source of our supply as culled from the sun's munificence in past ages and stored for us in the carbonaceous minerals which the earth contains. Whether it be the wasteful coal fire with its faults and virtues, the hot water or steam plant, the accommodating gas or electric stove or heated fresh air which we favour, the ultimate source is really the same, the stored-up energy of the sun which has produced combustible material.

Before considering the various means at disposal for heating buildings it may be well to make clear the distinct ways in which heat can be transmitted from any source of energy to the space or material to be heated. These are three in number, known as conduction, convection and radiation. In the first the heat passes through a material by the transmission of internal or molecular vibrations, the motion caused in the part of the body heated being transmitted to adjoining parts much as the swing of a pendulum might be transmitted to other adjoining pendulums against which it knocked. The metals, particularly copper, are most efficient as conductors and dry air is the worst conductor, which is chiefly why porous non-metallic materials like wood and felt preserve heat in pipes or buildings. Direct conduction has very little use in the heating of buildings, except indirectly, as above stated. Transmission by convection, on the other hand, plays a large part in heating schemes. By this mode of transference the heated material itself moves and conveys its heat to its surrounding bodies. Hot water and hot air circulating systems work chiefly by convection, aided in the former case by the conduction of the pipes and radiators through which the water travels. Lastly, heat is transmitted by radiation, in which manner it reaches us from the sun, between which and ourselves no conduction or convection can take place through the ninety odd millions of miles of empty space. The curious and important fact about radiation is that it is transmitted through air without appreciably raising its temperature, and only becomes sensible heat when it strikes a solid or liquid body. This is the ideal method of heating, and probably all would agree that nothing healthier or pleasanter could be obtained than a store of sunshine could we but supply a stock of it to heat our buildings in winter time. Until scientists can show us how this can be done we must be content to utilise radiation from artificially-heated bodies as far as possible. Now all hot bodies radiate to some extent, but this method of transference takes place in a rapidly accelerating ratio as the body gets hotter. A hot-water radiator radiates a little heat, but chiefly warms the air by contact; a steam radiator gives more by the former method, but nothing like as much as a red coal fire. But in all systems of heating, a factor which does not exist in the open air has to be reckoned with, and that is the necessity for ventilation. The air in rooms occupied by persons must constantly be changed to remove the moisture and organic matter thrown off by the pores of the skin and from the lungs. If, when we have a national electric supply (assuming this is not burdened with too great an army of red-tape-entangled officials), we may hope to have electrical energy cheap enough to perhaps encourage us to instal miniature suns in the shape of red-hot balls suspended in our rooms with suitable protection for our sight and with such ventilation arrangements as shall carry away any charred organisms. These will play the dual rôle of sources of both heat and light. In air cool and breathable, we shall all receive in any part of our rooms radiation which will warm us, and that which falls on walls and ceilings will in turn warm them or be returned to us by reflection, thus producing an equable and healthy condition of temperature. This is not yet, and in the meantime we should endeavour to obtain as much heat by radiation and to heat evenly our room boundaries as far as possible, by existing means.

Whether a room feels hot or cold depends, however, not only on temperature, but on moisture, and any healthy person who has endeavoured to reconcile his feelings as to warmth with the indications of an ordinary thermometer will probably have been struck by the inadequacy of this instrument to respond to his ideas or the subject. The reason for this is that moisture in the air also plays a very large part in our sensations of comfort. This is not the occasion to describe the moisture-recording or "wet and dry bulb" thermometer, but it may be stated that the difference in temperature shown by it should range between 4 and 8 degrees, if the amount of moisture in the air of a room is to be regarded as satisfactory.

Armed with some general conceptions, let us now consider the different means at disposal for heating buildings in actual practice. These are many, and none can be said to be best because of the widely different circumstances which different classes of buildings embrace, but if classification is necessary it might be based on (1) means depending on the direct heat of various forms of fuel; (2) indirect use of fuel through the medium of hot water; (3) through the use of steam; (4) through the use of hot air; (5) by electricity. The first would embrace coal fires, coal and oil stoves, and gas fires. The second low-pressure gravity, mechanical and calorifier hot-water, and high-pressure hot-water plants. The third, low, high, atmospheric and vacuum steam plants. The fourth, heated air (generally combined with a ventilation system) and the last, electric stoves.

Open Fires and Stoves.

The open fire is wasteful and too local in its effects, but it is very hygienic and attractive. It entails much dust and labour, but retains its place and is likely to do so for domestic buildings. The improvements in the modern grates have much increased the efficiency of open fires and further improvements are possible, as, for example, in the ready adjustment of the size of a grate to suit climatic changes, and to keep alive the embers until they are entirely consumed. A very large proportion of radiation is obtained from an open fire, which also acts as an excellent ventilator. Closed stoves, except such as are arranged for very slow combustion, and which are much used for burning wood on the Continent and anthracite in this country, are generally held to be undesirable unless under careful regulation. They are very economical, and with long, good-conducting flue pipes, almost the whole of the fuel heat may be utilized. If, however, the stove gets very hot, there is always the danger of the production of the highly poisonous gas carbon monoxide, either by the reduction of carbonic acid gas in the air or by the escape of incompletely burnt gases from the fuel. Stoves burning oil are seldom used except for auxiliary heating in places where no other means of heating are possible. All that need be said about them is that they can be used quite free from the smell of oil if they are kept really clean and free from spilt oil when filled. Any stove, however, without a suitable flue to carry off the products of combustion is always very undesirable.

The gas stove, which has in recent years gained so much popularity, has obvious advantages over a fire or fuel-consuming stove for intermittent use. Some prejudice exists against gas on grounds of health, but this does not appear to be justified. An exhaustive series of tests on gas stoves published in the *Lancet*, November 17th, 1906, seems to show conclusively that when properly constructed and given ample flue, gas fires have no objections. Among the conclusions given, this report states: "Although more costly for constant work than a coal fire a gas fire is quite as satisfactory from a hygienic point of view, and does not in any way vitiate the air of the room, nor does it produce any abnormal drying effect, as is popularly supposed."

Hot-water Systems.

The simplest hot-water system works by gravity, the boiler being placed at the lowest point and the mains rising steadily without dips to the highest point of the system, whence they return on the fall to the boiler; but where mechanical power is available, the introduction of a pump which "screws" the water along the mains is a great advantage. In new systems, this enables smaller pipes to be used and quite appreciable dips in the mains to be introduced—often a great help in getting over constructional difficulties—while old systems partially "furred up," or to which extensions have been made, rendering the mains too small for their work, can be readered again efficient by this comparatively inexpensive means. Of course, an electrically driven motor is usually employed for this pump, and can then be placed in the charge of an unskilled attendant. This method of accelerating water circulation is not as new as is often supposed. The writer believes it was first employed by Anderson at Banstead Asylum as early as 1877.

Another means of producing acceleration of a hot-water service is by means of steam produced in or injected into the rising main, which thus forces the flow and consequently "speeds up" the whole circulation. Sometimes, again, a special valve or tank is arranged at the head of the system, whereby, owing to a reduction of pressure, a similar effect is called into operation. Such systems cannot claim the certainty of action under various conditions of temperature and boiler firing possessed by those operated by a pump, and, though less costly both in installation and maintenance, have not found such general favour.

Occasionally it is desirable to heat water, not directly by means of fuel, but by steam, possibly waste steam, or even another water supply which cannot be mixed with the water circulating in the heating system. In this case a calorifier can be employed, which usually takes the form of a cylinder through which the water passes on its way through the mains, containing a large number of copper or brass tubes, through which steam passes, thereby heating the water but not mixing with it, provision, of course, being made for carrying away the excess and condensed steam at the other end of the tubes which run through both ends of the cylinder. In such a scheme the calorifier, unless it is used to reinforce an ordinary hot-water plant, may be looked upon as equivalent to the boiler, and for a gravity system would be placed in a similar position.

The foregoing remarks have reference to low-pressure hot-water systems, in all of which the circulating pipes are open to the air above the level of the expansion tank at the head of the system. This term "low pressure" is, of course, relative, and in a high building the actual pressure in the mains may often be 15 or 20 lb. per square inch above that of the atmosphere, and precautions may be necessary in the matter of the periodical testing of boilers and their safety valves, just as for high-pressure services. By high-pressure hot-water, however, is generally meant water circulating in a completely enclosed system of piping. In this system the mains are necessarily of wrought-iron and are always small, usually ¾ of an inch, and the boiler is replaced by a coil of such pipe, which is heated direct in a fire. Radiators are replaced by pipes, and joints are reduced to a minimum. Since the actual quantity of water contained in such a system is small, it quickly responds to furnace changes—it is soon "up" and soon "down."

The chief difference between high and low pressure systems lies in the temperature of the water, and hence of the pipes or radiators. Though water boils at (roughly) a fixed temperature in an open vessel, it is quite possible to heat it much more highly in an enclosed space; in fact, the temperature attainable is only limited by the strength of the enclosure which prevents the formation of steam. Pipes heated by this system are much too hot to touch and have to be protected like steam pipes. This system is not widely employed for heating buildings, and if it is to be safely used, periodical attention must be given, one of the chief difficulties being the air, always dissolved in water, which is expelled on heating, and which exerts in the confined space great pressure.

Heating by Steam.

Steam is seldom used for heating small buildings, and is not so popular in this country as in America. Some prejudice exists against steam on the score of danger, but this is quite unfounded. The pressure in a low-pressure system is seldom more than 10 lb., which is much less than in many low-pressure hot-water plants, and steam can be used at and even below the pressure of the air. The advantage of steam is that the service pipes required are small and circulation rapid; hence a large building can soon be brought up to any required temperature given a banked-up fire under the boiler. More or less skilled and constant attendance is required for steam plants, and large boilers of the Lancashire type are frequently used. The mains should be laid to a fall to drain off condensation, and steam traps may also be necessary for this purpose. Sometimes exhaust steam is available from a boiler used for other purposes, such as operating machinery, when, of course, this method of heating is very economical. In such cases the steam is generally used at atmospheric pressure. By the use of an exhaust pump, steam may be used below air pressure, which assists in its transit through the pipes and renders any damage by leakage impossible as, in the event of such defect, air is drawn into the pipes. Special valves are necessary for fittings for vacuum steam, but the temperature of these fittings need not render their protection from contact by persons necessary.

Hot Air.

The use of heated air is probably the oldest method of warming, apart from the open fire, and was used by the Romans, who passed into their buildings air which had been warmed by furnaces. Hot-air systems in these days usually suggest the "plenum" system of ventilation in which cleaned heated air—the heating being effected by furnaces, the combustion products of which, however, do not mix with the air—is supplied with moisture and pumped into the building. Now, though this cumbrous and expensive arrangement may be desirable in special circumstances, say, for a congested slum hospital, it does not supply radiant heat, and, moreover, necessitates the breathing of air at a temperature above that which is really necessary, and is thus apt to produce an enervating effect. The absence of pipes and radiators is undoubtedly an advantage, but the writer would like to see hot air used, not as an air supply, but to heat the surface boundaries of rooms and thus produce radiant heat—at least in some measure—and enable a cool atmosphere to be retained. Many floors are in these days composed of hollow terra-cotta. Why should not a slight modification of these terra-cotta blocks be made to convert them into air channels for connection to a suitable series of wall flues attached to a furnace. If such a scheme proved feasible, no more even distribution of heat could be desired.

Electric Stoves.

For reinforcing other sources of heat or for limited or intermittent heating, especially when difficulties arise in the provision of flues, electric heating forms a most valuable aid, often solving an otherwise insoluble problem. The present price of electricity, however, renders electric stoves much too costly for general introduction.

National War Museum.

A decision is expected shortly regarding the advisability of holding an interim exhibition of part, at all events, of the war trophies now in the possession of the War Memorial Committee.

WOOD FIRES.

IT is difficult to believe that the open fire will disappear from our homes, and of the various kinds of open fires there is none more pleasing to the eye than the wood fire laid on the hearth or with firedogs and baskets. Our ancestors were not greatly troubled perhaps, even if they were inflicted with down draughts and smoky chimneys, but nowadays we want all the quaint and picturesque charm of the Middle Ages without any of the discomforts. It may appear an odd time to be singing the virtues of wood fires, but the time will assuredly come again when we shall have plentiful supplies of wood, and it is probable that even now there is a fair amount available for this purpose. No amount of scientific heating compensates for the loss of a great, crackling wood fire for the hall of a country house, whether for its pleasant, illuminating glow or direct rays of warmth and comfort. But if such a fireplace is to be made endurable in a modern house the supply of air and exit of smoke must be properly considered. In many cases it appears to be thought that any shaped open cavern will do for a wood fireplace, whereas a little care and thought in the arrangement and form will ensure success. The subject has received a good deal of consideration from Mr. W. Robinson, the accomplished gardening expert and well-known author of "The English Flower Garden." We think our readers will be interested in the following extract from this little booklet, which we noticed last week, entitled "My Wood Fires and their Story":—

"Some years ago I came into possession of an old Manor House, built in 1596, with much to be done to it. Worse than all were the fireplaces. They were in old days meant to burn wood, but had been diverted from their old uses to modern ones with little success. Old fire hearths had been closed up and ways tried to adapt the fireplaces to the use of coal, attempts mostly futile. Not one of them could be well used owing to smoke, and various contrivances to get rid of that nuisance were ineffectual.

"With plenty of wood in the place it was

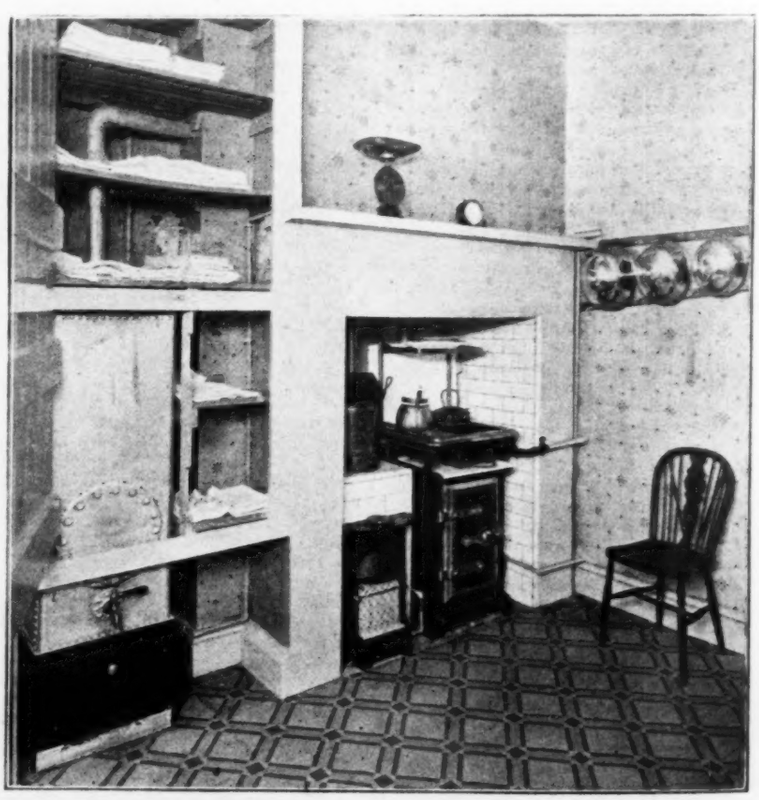

Fig. 1.—A modern "All-gas Kitchen" in a flat, showing domestic gas incinerator in position over gas fire. (*See* p. 187.)

wrong that the best of all fuels could not be well used in the house, and this led me to consider the problem in all ways. I have had so much pleasure in the result that I would like to convey it to others who are fortunate in having supplies of wood. Many people must be in the same plight, judging by the grates in country houses one sees pictured in the illustrated papers. It is a rarity to see the wood fire in its right place, and grates and various contrivances for getting a draught are used. Such is the vogue of coal that even on estates where wood is abundant, one may see people crowding round ugly iron grates trying to warm themselves; and there is an idea that you cannot be warmed with wood fires—a stupid mistake arising out of the fact that the good old way of managing wood fires is to a great extent lost. The modern buildings are no help to its revival with their narrow chimneys built for burning coal.

"The first thing I had to consider was to get effective fires, and then the question of draught came in, the narrow chimneys being useless for the burning of wood. Owing to closeness of construction the air in a room is not always sufficient to feed a wood fire; and therefore it is essential to bring the air in from outside, under and round the grate, up the sides and into the chimney. The air is thus heated automatically and rises just in the right place. This I learned in France, where the wood fire has survived to a greater extent than with us.

"The smaller the rooms, the greater the difficulty about draught and the more the need for bringing the air in from outside in the way described, *i.e.*, a small tunnel leading in at the back of the fireplace. I have tried the plan in various houses with success. It is much easier to carry out when building a house; but even in old cottages where applied it is successful.

"In all cases when a fire is attempted in a hall of any size or in any important chamber of a house the size of the chimney should be 14 in. by 14 in. if the hearth is to carry a wood fire. None of the considerations which apply to a coal fire should ever be thought of in connection with a wood fire."

HOW THE WAR HAS INCREASED THE USE OF GAS.

THE past year has seen further great increases in the use of gas for all purposes. Indeed, we understand that many gas undertakings found some difficulty in coping with the great demand that arose for gaseous fuel during the exceedingly inclement weather we experienced at the latter end of last winter. This is understandable when it is borne in mind that not only was more gas needed for domestic, factory, and office heating by existing installations, owing to the coldness of the weather, but because the number of such installations increased so materially during the season in question.

An important factor, also, was the huge additional installations for industrial uses of all kinds, which are now becoming a normal feature of the business carried out by all gas undertakings.

Are the Increases Permanent?

The question which will naturally present itself to our readers is whether these great increases may be looked upon as a temporary and evanescent—for the duration of the war—feature, or whether they have come to stay, possibly even foreshadowing greater increases in the near future, that devoutly looked forward to and much to be desired period "After the war."

It is the writer's firm belief that the latter possibility is the one most likely to be fulfilled; indeed, great as the increases have been they are likely to be exceeded in the coming years. Of course there will probably be a period immediately after the cessation of the war when the output of gas undertakings will be temporarily reduced, owing to the closing down of a number of Red Cross hospitals, war requisites associations, and other purely "war" institutions, and, of course, the cessation of the manufacture of a large amount of purely war material.

Gas Appliances for New and Old Trade Processes.

But one cannot believe that this will be more than a temporary check. On all sides one hears of new forms of gas appliances, specially constructed to carry out hitherto unheard of trade processes, as well as the application of gas as a fuel to some of the oldest manufacturing processes. In some cases the manufacturers have been driven to use gas owing to the difficulty connected with obtaining solid fuel and finding the necessary labour to handle it when obtained, and, having been driven to use gas, wonder why they did not use it before. They have discovered that by the use of gaseous instead of solid fuel they have been able to obtain increased rapidity in action, and steady and reliable temperatures, leading to a greater output with a material saving of labour. It would not be untrue to state that there is practically no trade process requiring heat in any form to which gas cannot be applied. Many large gas lighting installations, both high and ordinary pressure, have also been carried out during the period in question.

Specially Reconstructed Buildings.

Again, in many cases gas has been installed for heating, cooking and water heating in buildings which have been reconstructed for special purposes, and in which important structural alterations have been obviated by the use of gas to supply hot water or for cooking operations, many times beyond the greatest estimated requirements of the building in question, in its pre-war condition. These installations have brought to the notice of many people the usefulness and adaptability of gas, in a way that years of advertisement could never have done, personal experience being the best form of education.

The domestic labour problem is more than ever to be considered as regards the future. It was difficult enough, in all conscience, to get suitable domestic help before the war. What will it be like after the war, unless what is looked upon as the "drudgery" part of the work is materially lightened.

How many mistresses have lost a good domestic servant during the war, who, having taken up munition work or business work of some kind, will in all probability never return to house work again? Women who have been stranded and have had perforce to "carry on" unaided or with far less help, have installed labour-saving appliances in the form of gas cookers, fires, water heaters and refuse destructors. Is it not likely that such installations will increase in the future, in order, if not to attempt to induce the old domestics to return, at least to make the work more attractive to those who may be induced to take up, and continue, what after all most women should know something about—domestic work?

The All-gas Kitchen.

Owing to the domestic labour problem, and to the difficulty in obtaining coal as rapidly and in such quantities as could be desired, we hear of the occupants of many good-class houses installing large numbers of gas fires and also using gas cookers and water heaters, to the exclusion of their coal ranges. Flats have also been more extensively fitted with all-gas kitchens, the usual method being the removal of—or, in newly-erected flats, the non-installation of—the coal range, tiling or rendering out the recess and fitting a gas cooker and water heater, and a small gas-fired domestic refuse destructor with sometimes a gas fire in addition. One such combination we illustrate in Fig. 1, showing cooker, fire, and refuse destructor or burn-all, in a recess, with a gas boiler in the airing cupboard at the side.

The destruction of refuse by large gas-fired incinerators, or the new small domestic type, has also materially increased, and when these appliances are better known their use will be more widely spread, to the hygienic benefit of both individuals and the community.

Hospitals are very rapidly becoming large users of gas fires, clearly indicating that the old prejudice against gas heating has disappeared,

Fig 2.—Ward Kitchen at St. Bartholomew's Hospital, Smithfield, showing Combination Range, comprising Gas Fire, Oven, Hot Closet and Hot Plate.

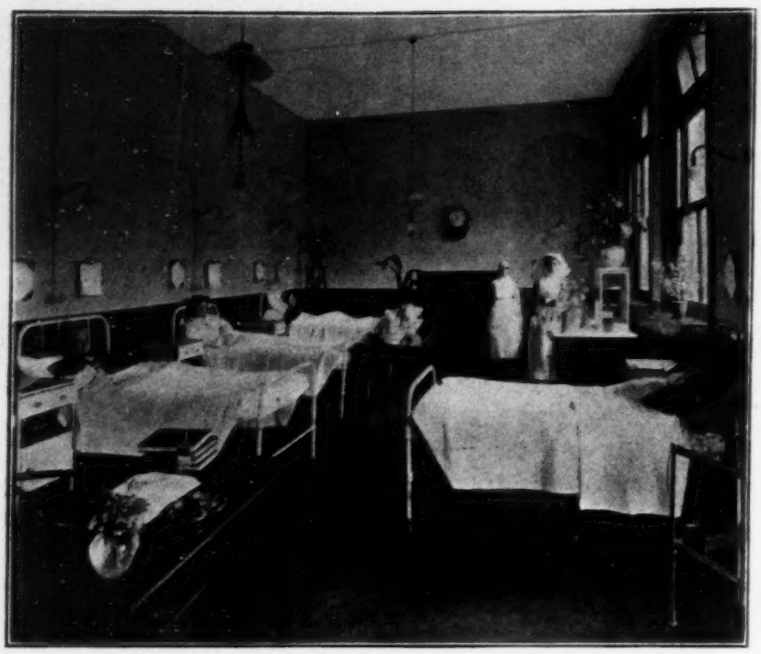

Fig. 3.—Samaritan Hospital for Women. Heated by Built-in Gas Fires.

and that the medical profession are satisfied that modern gas heating is completely hygienic. In connection with this, it may be mentioned that one large hospital that has taken up extensively gas heating and increased gas apparatus for cooking, has increased its gas consumption from 10 millions of cubic feet in 1915 to 24 millions in 1917.

Some Interesting Installations and Novel Features.

It is, perhaps, worth while referring to a few of the many interesting gas installations that have come to our notice, and also one or two new features in connection therewith, that will no doubt be of interest to our readers.

In all hospitals there are what are known as ward kitchens. These are used by both day and night nurses, and they should contain suitable apparatus for minor cooking and boiling purposes, and for keeping food hot that has been sent up from the main kitchens. Incidentally there must also be provision for a fire or some form of heat for the winter days and cold nights. In the majority of cases when *all* these wants have been fulfilled in the past, it has been by means of a coal range; but having regard to the labour problem connected with the carrying of coal, the necessary cleaning, &c., and the disturbing noise connected with poking and raking the fire and replenishing it with fuel, in many cases gas cookers have been installed. There is, of course, nothing new in that, but if reference is made to Fig. 2, it will be seen that a new type of combination gas range has been installed at St. Bartholomew's Hospital, London, comprising a hot plate, a hot closet, an oven, and a gas fire. We understand that the design originated at St. Bartholomew's Hospital, and that a number of these have already been fixed there in the ward kitchens, the coal ranges having been removed for the purpose. Similar stoves are also being installed in another hospital.

The whole of the Samaritan Hospital, Marylebone-road, London, is now heated by gas. The existing coal grates were all cut out and gas fires installed. A view of one of the wards is shown in Fig. 3.

Heating an Operating Theatre.

An interesting installation in a hospital operating theatre is illustrated in Fig. 4. This consists of ordinary hot-water radiators heated from a gas boiler which is situated outside the room, because, as is well known, an operating theatre should contain as little extraneous apparatus as possible. Of course, hot water radiators are quite common in operating theatres, but they are not always all that are to be desired when they are heated from the large central coke or coal boilers, as, owing to the fact that heat may be required in the theatre at any moment day or night, boilers may sometimes need to be kept going unnecessarily for this purpose; while gas boilers may be lighted when needed, and will rapidly heat up the small section of radiation required, without interfering in any way with the other extensive water heating arrangements of the hospital.

The extension of the use of gas for cooking has already been referred to, but we may mention a new departure in large cooking apparatus. For some years, a type of large gas range with closed hot plate and externally heated ovens has been in use in hotels and other institutions where extensive cooking operations are carried out, but in the course of the past year what we believe to be a unique range, was installed at a large London club. This was constructed in the form of a large gas range in the centre of the kitchen, with closed top plate; also with externally heated ovens both front and back, with downcast flues behind and between them, contained within the structure. The products of combustion are then conveyed away through flues running under the floor to a chimney shaft. The effect of this is to give the chefs a clear passage round the range, and an absolutely smooth top plate over which they can freely move their pots and pans in any desired direction, placing them over that part of the closed hot plate where the desired amount of heat is obtainable, according to the regulation of the burners, which are to be found in various positions underneath.

Heating an Aeroplane Factory.

We have referred to the extensive increase in the use of gas for industrial purposes. In connection with this the great part that gas has played in the manufacture of munitions of war of all kinds should be borne in mind. We illustrate in Fig. 5 an example of gas radiators installed for maintaining high temperature in an aeroplane factory. An interesting illustration (Fig. 6) shows a good example of the rapidity with which factories have been adapted to war work. Musical instruments were previously manufactured here, but the demand for these becoming somewhat lessened, gas furnaces were ordered and installed in a few days, and the same shop was transformed into a highly important adjunct to our Army supplies.

The operation carried out is the tempering and colouring of small steel cartridge clips; each furnace dealing with about 10,000 clips per day.

Coal gas has also been used for propelling vehicles, a notable instance being the motor char-à-bancs from London to Eastbourne, the gas being contained in a large bag on the roof of the car. There seems no doubt that this practice is

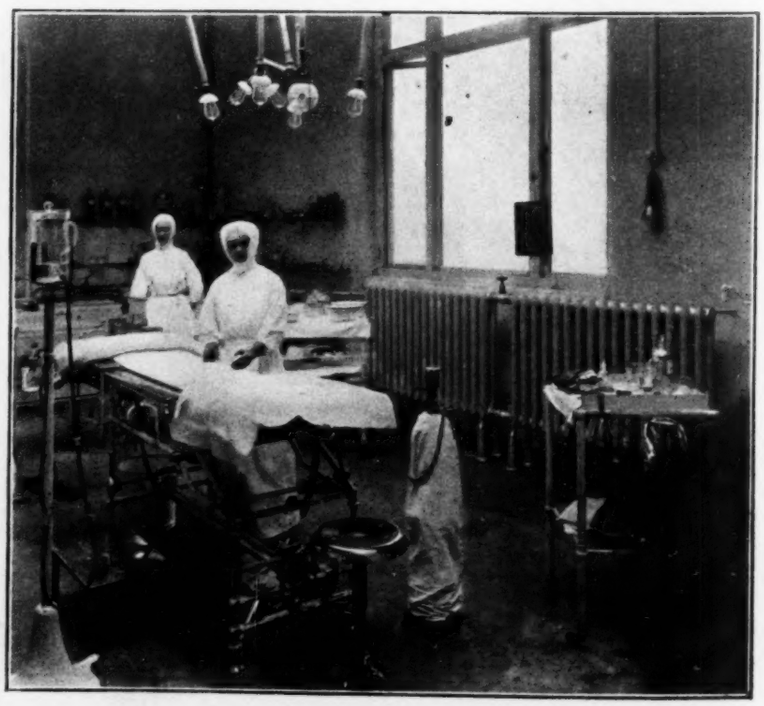

Fig. 4.—Operating Theatre, West London Hospital.
The Hot Water Radiators are heated by a Gas Boiler fixed outside the room.

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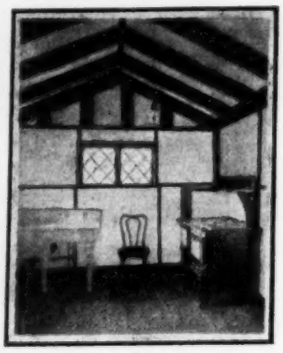

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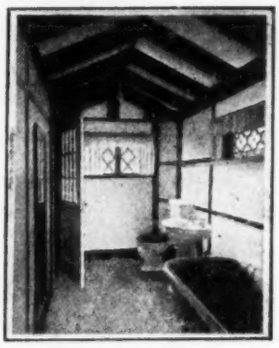

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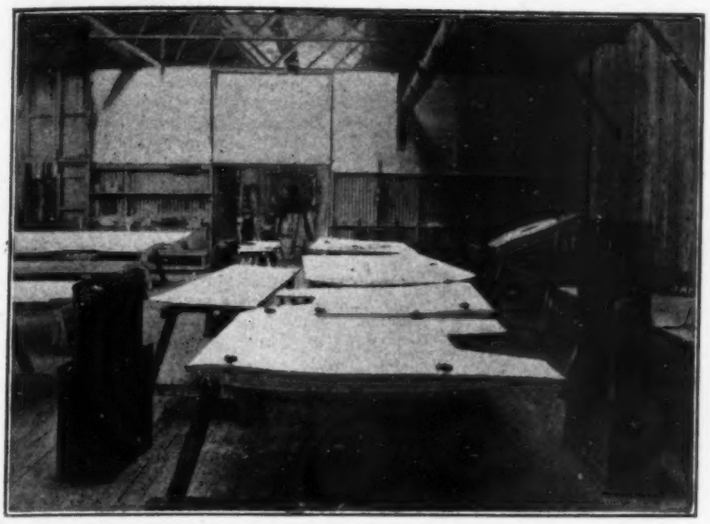


Fig. 5.—Gas steam radiators for maintaining high temperature in an aeroplane factory. (*See* p. 188.)

already extending, and may do so even after the war, possibly with gas stored in cylinders under high pressures.

While on the subject of motors, a brief reference may be made to an interesting installation for testing, or what is known as "running in," motor engines by coal gas, before attaching them to the chassis. This system is frequently adopted, as it is more simple and less expensive than using petrol for the purpose. A large firm of engineers had their testing shops fitted in this manner during the past year, their specified requirements being a delivery of gas at the voluminous rate of 14,000 cubic feet per hour, day and night.

There has been a rapid extension of the use of gas heated apparatus for drying and preserving fruits and vegetables, and there is every probability that many tons of valuable food will be preserved in this way in the future (even after the war) that were wasted and allowed to rot in the past. To reverse an old quotation, "War hath its victories no less than peace." Enough has been said to show that while the increase in the use of gas has been phenomenal, it is unlikely to be ephemeral. It is very improbable that those who have experienced its labour-saving and other qualities will depart from its use after the war, except as regards the shutting down of processes or apparatus that are entirely and purely for the war.

SCIENCE USEFUL TO PLUMBERS.

IV.—WATER PRESSURE.

WATER and other liquids are absolutely limp, that is, they have no power of "holding up" in any shape whatever unless supported by some surrounding vessel. From this some important properties of water follow, the most interesting being that the slightest pressure on water will make it move, provided it has anywhere to move to. If a stone be dropped in the middle of a pond it moves the whole of the water in the pond, and the whole level of the water surface is raised, the water displaced by the stone in its turn displacing surrounding water and the effect is eventually spread over the whole surface, which must be admitted, as the surface is always level. Of course, the actual effect is trivial, but the principle underlying it has wide application and may be expressed by saying that any force, however small, will move any quantity of a liquid. This is true even of thick liquids like tar if enough time is allowed for the force to take effect.

If two vertical pipes be connected at the lower ends and water poured into one of them, it will rise in both, and when it comes to rest the water surface in both will be the same level, and this will be true whatever the shape or path of the connecting piece. This is generally expressed by saying that water finds its own level. That this must be so is easily shown, for if the water stood higher in one pipe than the other, there would be more pressure at the bottom of this pipe, and this would mean a force which would push up the water on the other side until it was able, because of its height or "head," to press back with an equal force, which would be when the water was the same height in both pipes.

Pressure Gauges.

Open pressure gauges depend on this principle. A U-shaped glass tube open at both ends is partly filled with water (or some heavier liquid like quicksilver), and one end is then attached to the apparatus, say a gas supply, the pressure of which is required to be found. The water is thus pushed up towards the open side and since, when it comes to rest the pressure must be the same on both sides, the number of inches higher the water stands in the open tube above the level in the tube connected to the gas must be the gas pressure in inches of water.

Air Test for Drains.

In the same way if such a gauge be connected with say a closed soil pipe and a little air be sucked out (or blown in), so that the water stands at a slightly different level in the two tubes, owing to the difference in pressure thus caused, if the soil pipe has the slightest leak, the water will begin to fall until it is the same level again in both tubes, owing to the entrance of (or escape to) the outside air.

Water presses equally in all Directions.

It is hardly necessary to argue that water does produce pressure, but this can readily be shown by putting a piece of card on the end of an open pipe and sinking it, card downwards, in water, when it will be found that to dislodge the card will require some force.

That water presses equally in all directions is manifest from the result of applying a plunger to a vessel of water containing several outlets from which water will squirt, no matter where these are placed. The effect of a plunger on quite distant gulleys filled up with water in a drainage system is a good example of such transmission. For a given pressure—say, the head of water

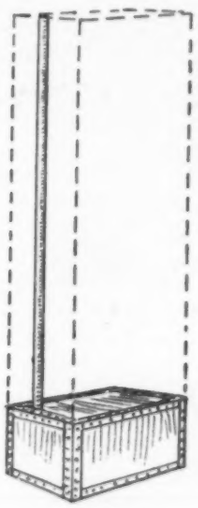


FIG 1.

due to a roof cistern—every square inch of pipe and apparatus at the same level will bear exactly the same pressure, and the total pressure on a particular surface will therefore be in proportion to its area. It should be noted that the size of the roof cistern (apart from the water level in it) has nothing to do with the pressure; hence a mere open pipe full of water will produce the same pressure as a large cistern having the same water level. This fact leads to the

Fig. 6.—Plant for tempering and colouring cartridge clips. Part of transformed factory. (*See* p. 188.)

seemingly rather curious result that the pressure on the bottom of a vessel may altogether be very great, although the amount of water above it is small. Thus, if a long vertical pipe be screwed into the top of a closed cistern and the whole filled, the pressure on the bottom of the tank is the same as though the whole tank were as deep as the height of the pipe, as indicated by the dotted lines (Fig. 1). The opposite of this is equally true; that is, if the water area above is larger than that of the bottom of the vessel considered, this will not increase the pressure, which will, as before, be dependent on the area of the bottom and the height of the water. Take the pressure on the valve of a valve closet, for example; although the water contained in the vessel is considerable and its surface area large, the pressure on the valve is only that of a

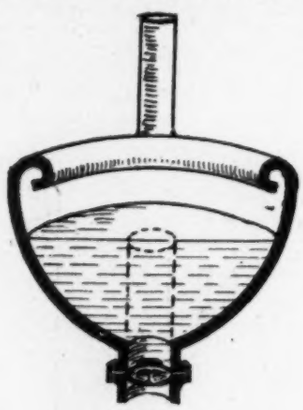


FIG 2.

column of water with the area of the valve as base and a height equal to the depth of the water as dotted in the Figure 2.

Since the pressure of water increases with the depth or head, structures for retaining deep water must be made stronger at the bottom than at the top, and though the depth of tanks is seldom sufficient to require this consideration, it is often enough to have some influence on the placing and dimensions of stays and plates in large undertakings.

How Things lose Weight in Water.

It is well known that when anything is placed in water, it loses weight, which may be explained by the following simple experiment. If a tumbler be partly filled with water and the water level marked, on dropping a pebble into it the water level will be raised to an amount depending on the size of the pebble. Now the raising of water means creating pressure, and were the pebble withdrawn the water would fall back again. The water displaced by the pebble therefore exerts a pressure which may be regarded as tending to force the pebble up so that the water can fall down; and though, since the pebble is heavier bulk for bulk (has a greater specific gravity) than water, this downward pressure is not enough to make the pebble float, it does, however, make it lighter, and it is found that the loss of weight is always equal to the weight of the water displaced, that is, the weight of water equal to the bulk of the body sunk in it.

Conditions for Floating.

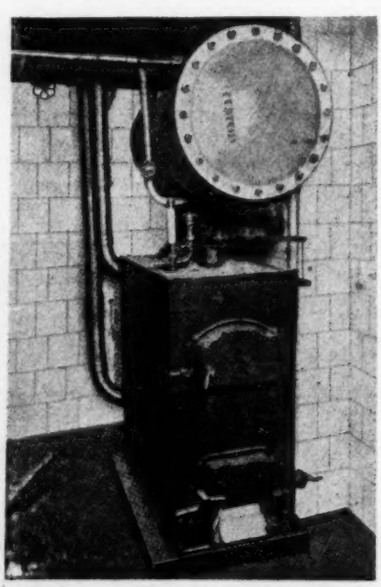
From the above, it follows that if a body is bulk for bulk lighter than water, and is put under water, the upward pressure due to the weight of the displaced liquid tending to fall back will be greater than the downward pressure due to the weight of the body. The result will be that the body will be forced up out of the water, or, as we say, will float. How far out of the liquid it will float will be governed by how much lighter it is than water, and a little consideration must show that, in order that the force tending to make it sink shall be equal to the force tending to force it up (under which conditions alone it can remain still), *the weight of the whole of the body must be equal to the weight of the water which the part of it immersed displaces.*

It should be noticed that it does not matter, as far as the floating level is concerned, whether the body is the same all through, like a piece of wood or hollow like a ball valve. If its total weight is less than an equal bulk of water, it will float; and if hollow—since the hollow air space displaces water as much as the solid exterior—it will float higher out of the water. This pressure is the underlying principle of flotation of metal vessels. We talk about a ship's displacement in tons, i.e., tons of water displaced, which we now realize is the same as the ship's total weight.

[*** An article in continuation of this series will be given on "Air Pressure and Suction" in our next issue.—ED.]

TRADE NEWS.

We are informed by Messrs. Haywards, Ltd., 187, Union-street, Borough, S.E., that their heating and ventilating department has been well maintained during the past year, notwithstanding a large number of buildings have been closed down and stopped. Large systems of Plenum heating and ventilation have been carried out for Government contractors, in accordance with the general requirements of authorities; and for the ventilating and heating of special dope rooms for aircraft works, &c. A large amount of heating by steam and hot water has also been installed for buildings engaged on special war work; also there has been a fair amount of small private work for hospitals and other buildings, &c. As to heating, some interesting examples have been employed, the types embracing the various systems in general use—steam, hot water, &c. These may be carried out in big munition factories by separate steam boilers of Lancashire or other type, or from waste steam; or for buildings of moderate size the low-pressure hot-water circulating system is simple and reliable, when well schemed and used with proper skill. In some cases, besides heating, a suitable and convenient hot-water service is a necessity, and these can often with advantage be carried out together. The accompanying illustration shows a convenient application of this, worked from one furnace, partially automatically controlled, little attention being required for stoking, &c.



Hot-Water Service as installed in a Bank.

The lower part shows a square, efficiently lagged boiler of good type, from which heating mains can be observed coming away at the back and going direct to a system of piping and radiators, —in the particular case, being a large bank premises, with radiators in all rooms and corridors as well as overhead, around skylights and domes, to prevent cold down draughts; whilst above the boiler is an efficient calorifier for the hot-water service about the premises.

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H.M. Office of Works.

Building Works.—Allies' Supplies Commission, Queen's House, Kingsway, Partitions: Higgs & Hill, Ltd., South Lambeth, S.E. London District, Erection of Semi-Permanent Huts: William Lawrence & Sons, Ltd., London E.C. Mercantile Marine Office, Erection, of Temporary Building: G. E. Wallis & Sons, Ltd., Haymarket, S.W. Public Offices Extension, Extension of Temporary Offices in Circu'ar court: Thomas & Edge, Woolwich. War Office (R.F.C.), Erection of Temporary Building: Ford & Walton, Ltd., Kilburn. War Office (D.D.R.T.), Horse Guards, Erection of Temporary Building: Ford & Walton, Ltd., Kilburn.

Furniture.—Armchairs: Thomas Glenister, Ltd., High Wycombe; Goodearl Bros., High Wycombe. Bookcases, Chests of Drawers, and Wash-hand Stands: J. Heywood, Ltd., Manchester; R. Stone & Son, Ltd., Wellington, Salop. Chairs (Deck, with Arms): J. Parnell & Son, Rugby; Hoskins & Sewell, Ltd., London, W. 1 Chairs (Easy, Wicker): Horace Mills, Newark-on-Trent. Chairs (Arm, Easy) and Couches (Chesterfield): Bessants, Ltd., Berners-street, W. Drawers (Chests of), Wash-hand Stands, &c.: R. T. Colley & Sons, Birmingham; A. Younger, London, E.C. Kew, Head Insurance Office, Desks: Siemens Bros. & Co., Ltd., Woolwich, S.E. Presses: Wake & Dean, Yatton, nr. Bristol. Tables and Trays: W. Moss & Sons, Ltd., Loughborough. Tables (Draughtsmen's): W. Moss & Sons, Ltd., Loughborough. Tables (Writing): Jones & Seward, Bournemouth.

Miscellaneous.—Extincteurs (Fire): General Fire Appliance Co., Ltd., London, E.C.; Minimax, Ltd., Feltham; G. Miller, Ltd., Glasgow. Farnborough: Housing Scheme at Cove, Baths: J. & R. Howie, Ltd., Kilmarnock. Farnborough: Housing Scheme at Cove, Closet Sets: Wilmer & Sons, St. Mary Axe, E.C. Farnborough: Housing Scheme at Cove, Portable Boilers: George Wright, Ltd., London, E.C.; Spiers & Co., London, E.C. Farnborough; Housing Scheme at Cove, Kitchen Ranges: The Interoven Stove Co., Ltd., London, W.C. Farnborough: Housing Scheme at Cove, Sewage Disposal: Tuke & Bell, Ltd., Tottenham, N.

Glasgow Archaeological Society.

Members of Glasgow Archaeological Society visited the Cathedral recently and were received by the Rev. James MacGibbon, minister of the Cathedral, who gave a short address on the historical associations of the fabric. Mr. T. L. Watson, F.R.I.B.A., explained the architectural features in a short paper, and thereafter conducted the party through the building, paying special attention to the vaulting of the lower church and Bishop Walter's chapel. Later the party proceeded to Govan and visited the parish church and the ancient monuments in the churchyard.

THE BUILDING TRADE.

THE TRADES' TRAINING SCHOOLS.

On the occasion of the distribution of prizes at Carpenters' Hall, London-wall, for session 1915–1916, in connection with these schools, an address to the students was delivered by Mr. Benjamin Greenwood. Though the address was given last winter, we are glad to give some parts of it *in extenso*, as it represented the considered opinion of a practical builder of very wide experience as to the value of the work which is being carried out by the City Companies connected with the building crafts at the Great Titchfield-street Schools.

"Let me first of all congratulate the Worshipful Company of Carpenters, and the other associated Companies, on the fact that they have continued to keep their schools open during the war. You cannot arrest progress without losing power. If a train has pulled up at a railway station, what an enormous power has to be exerted, when it starts, in order to regain the impetus which was lost when it stopped. That principle applies generally. You cannot arrest a work like this without losing impetus and wasting power, and I am glad that the authorities decided that, in spite of the war, this good work should be continued. When the war broke out the cry was 'Business as usual,' but we very soon found out that neither business nor anything else could or should be as usual. But there is no need to run to the other extreme and say that, because there is a war, we should do no business, for that error is just as great as the first one. I am quite sure that the right policy has been followed in continuing these training classes, even though they are depleted, even though they are carried on under very adverse circumstances. It is better to carry on than to abandon, even though the circumstances are not ideal. . . .

"We may well take a pride in our work. You know there are some who say that we cannot build in these days like they did in the good old times. Perhaps my opinion is a little bit prejudiced, but I will express it nevertheless. People point to the pyramids and say, 'That is the sort of thing the ancients used to do.' I have before now offered in public to take a contract to build a pyramid in Hyde Park any day you like under two conditions—the same conditions that prevailed when the pyramids were built—unlimited time and unlimited labour. Given these conditions we could erect pyramids all over the country if the Government wanted them, and erect them just as substantially as those that were erected years ago in the land of Egypt. I maintain that building in the present day, given the right conditions, is not only equal to, but can be made superior to, anything that has hitherto been produced on the face of the earth. But, of course, if you are supposed to erect a building that ought to take two years in six months, well, it is not proper building. And if you are supposed to do it for the low competitive price that fills your head with the thought as to whether you are going to get it done for the money, instead of whether you are going to put up a good building, those circumstances are all calculated to interfere with the quality of the work that is done. But, given favourable conditions, I say we can produce to-day—and perhaps some of these students here are amongst the number who can produce—buildings equal in quality and in stability to anything that the world has ever seen. . . .

"I have been an apprentice to the building trade myself, and I well remember it. I remember the first day when I started on my apprenticeship. My alarum clock woke me up at half-past four in the morning, and my father was astute enough to buy me an alarum clock that would not stop until you got out of bed and stopped it. Then I had three miles to walk in the dark, the snow was on the ground, and I got to the workshop at six o'clock. We used to start at six o'clock all through the winter in those days, and I know how, during those two cold hours from six till eight, I used to long for breakfast. I have been through it, and I understand it, and I am able to enter into the difficulties and also the privileges of those who are engaged in similar handiwork. I learned much, but I think I might have learned perhaps a little more. I was looking just now at some of your old work and I noticed amongst other things a very fine model of a circular staircase. I think it was an oval well-hole. If you asked me to set out a staircase of that kind and make the working rods I could not do it. And so I would invite the students who are here to-night to try and take a little better advantage of the opportunities that they have than I did, so that when you get to my age and stand in a similar position you will be under no obligation to make such a humiliating confession.

"One thing I admire about this training school is that it does not pretend to be a substitute for apprenticeship. Now there are many who are very great on technical education and they still cling to the fallacy that they are able in their technical schools to provide a substitute for apprenticeship. They never have and they never will. I grant that a student in a technical school may not need such a long term of apprenticeship as one who comes fresh to the trade, but the one never will and never can be a substitute for the other. You give these rewards for skill, and rightly so, but you cannot very easily give rewards for energy, although both count.

"When a young fellow gets into the trade he knows that energy counts as well as skill, and both are very important elements in the training of students. If you take five hours to do what the next student does in three, well, it is all right while you are at the training school, but when you get out of the training school you will find that it is all wrong, and that is one of the points which it is not so easy to deal with in a training school as in the old-fashioned system of apprenticeship. I was, therefore, very glad when Mr. Banister Fletcher assured me that the authorities at this school made no pretence of supplying a substitute for apprenticeship, but they endeavour, and rightly endeavour, to supplement the training the apprentice is receiving by giving him these opportunities in the evening to come and acquire further knowledge beyond that which he may be acquiring in the ordinary course of his employment. That is a very important point which I desired to emphasise and I hope I have done so. Now I want to give just three words of advice to the students I see here to-night and I will be very brief. The first is: 'Keep your tools sharpened.' A wise man wrote this: 'If the iron be blunt and he do not whet the edge then must he put to it more strength.' That is just it. If the iron is blunt and you do not sharpen it, you have got to put more force, and even then you fail to do so well as you would be able to do with less force and a sharp tool. Slovenly tools indicate a slovenly workman. But you must not only keep your tools sharpened, you must also 'keep your wits sharpened.' One lad will learn twice as much as another in some classes with the same teacher and the same opportunities, because one is keen to acquire the knowledge and the other has to have the knowledge, as it were, thrust into him by his teacher. And, lastly, my third word of advice is, 'Take a pride in your work.' The same old Book that I keep quoting (and I make no apology for doing so) speaks of a man who 'rejoices in his labour.' That is the sort of man—a man who finds a joy *in his labour*. You know there are some who begin on Monday morning, and the first thing they think of is Saturday night. There is no joy in their labour; such labour is a burden, a thing to be thrown off at the first opportunity. The lives of such men must be a very miserable kind of existence because they still have to keep at work all the time. But if only you take a pride in your work it means pleasure all the time. It is a good thing to be able to say at the end of the day—'something attempted, something done has earned'—well, a certificate! and to feel that in the work you are doing you are not slaves, that it is not drudgery, but an honourable calling in which any man is justified in taking a real delight and a real pleasure and a real pride. So then let those who do not take a certificate to-night be courageous and optimistic. Your turn will come. When I look upon an exquisite piece of work it is likely to have one of two effects. Either I say, 'That is so beautifully done that I can never hope to equal it; I will give up,' or I say, 'That is a beautiful piece of work that has been done by human hands; what human hands have done, human hands can do, and I will do it.' I play golf, or at least I try to, and occasionally I have been down in the Open Championship, and as I have watched the professionals play I have had conflicting emotions. I felt inclined to go home and burn my golf clubs. And yet there was another thought, 'Why may I not do as well as others have done?' Let the sight of good work done by better men be an incentive to lead us on to further endeavour, and not a thing to depress us. If we work in that spirit we shall be an honour to our craft and a blessing to our nation."

THE NEW TOWN OF ROSYTH.

The Parliamentary Committee of the Scottish Trade Union Congress have issued a report by a sub-committee on the Rosyth housing scheme. The laying-out of the streets, and the manner in which the houses are planned in blocks, the sub-committee state, is far in advance of anything yet attempted in Scotland. The streets are wide, with plots in front of the houses, a broad pathway, and a strip between the path and the street, in which trees are planted at regular intervals. There is no tendency to overcrowding, and in the space between the blocks of houses there is quite a good garden attached to each house, so that from the one block to the other there is a very considerable amount of ground. This ensures plenty of fresh air, and is at the same time a departure from former methods of town planning in Scotland. Viewed from a distance, the blocks of houses look clean and inviting; there is a warmth in appearance that is a decided contrast to the surroundings and appearance of any of our Scottish towns or villages, and to the dweller in tenements in our cities this modern town will create an envious desire to be a dweller therein. The houses, however, in the opinion of the sub-committee are not by any means ideal. The apartments are very small. The attempt to provide a habitable house with modern conveniences has led to scrimping the size of the apartments. The architect is on the right lines with regard to providing a good type of house, but it is obvious that he has been cribbed or limited to a given size. Given other two feet to the width of each house, and two feet or eighteen inches to the length, the living apartments would be wonderfully improved. The bathroom may be described as an apology, and a very poor one. In a space of five feet three inches by four feet three inches, there is a bath and water-closet. "It will tax the ingenuity of the grown person to wash by instalments; to bathe must be left to their imagination." The scullery is provided with a boiler and a wash-tub and sink, coal cellar, and a press or larder. The external walls are built of brick, and consist of an outer and inner course of brickwork with a two-inch cavity between. The outside of the walls is rough-cast. The roofs are tiled.

Another type of house visited was somewhat on a similar plan, with three apartments and scullery. The dimensions are—kitchen, 14

feet by 10 feet 9 inches; scullery, 8 feet by 11 feet 6 inches, with bathroom deduction from this size as in the former type; two bedrooms above, with floorage as below, with press wardrobe on stair and press in bedroom. The rental of the first type is 9s. 5d. per week, rates and electric light inclusive. The rental of the second type is 7s. 8d. per week, rates and light inclusive.

Another part of the scheme provides houses much the same for size as the first type described. The outer walls are constructed with slabs of concrete three inches thick, set up on edge twelve inches in breadth, an outer and an inner slab forming the wall, with a two-inch cavity between, and bound together by bedding iron ties at intervals across the two thicknesses. The sub-committee are of the opinion that the housing problem can never be solved if this kind of building is to be allowed. In a very short time, they state, the weather will throw off the rough cast from the lower walls, and repairs will be constantly required. The sub-committee feel certain that the housing problem is not being solved at Rosyth. Ground there is in abundance, but the element of profit-making enters into the production of the house, and therefore the accommodation is limited and restricted to a given size to obtain a return by way of rent to the capital invested. Housing, they are convinced, must no longer be left to private enterprise. The Government must finance and become responsible for providing healthy homes for the people.

LONDON ASSOCIATION OF MASTER DECORATORS.

A meeting of the Council was held at the Secretary's offices, at 14, Queen Victoria-street, on September 6, Mr. Stewart-Greene presiding.

It was reported that demands had been made upon certain firms by the operatives for an increase of wages, and the correspondence which had passed between the Secretary and the Operatives' Society was produced. From the correspondence it appeared that the men claimed the right to ask for as much as they could get, a course which was deprecated by the Council and regarded as not being within the scope of the Working Rules Agreement. The Secretary pointed out that he had requested the Operatives' Society to take the necessary steps to stop and prevent a recurrence of the trouble, and he understood that a meeting of the Operatives' Executive had been called to deal with the matter, and that the result would be reported in due course.

It was further reported that certain firms had been paying more than the standard rate of pay and it was decided to put on record the Council's disapproval of such a course, which they regarded as unfair to the large body of members who had remained strictly loyal to the Association by paying the recognised rate of 10d. per hour, plus 1d. per hour War Bonus, and the hope was expressed that those members who had been induced to depart from the regular rate would see their way to fall into line at once with the others.

A letter from Mr. M. C. Cowtan, the President of the Association, was read, in which he tendered his resignation of the President's chair. Mr. Cowtan's resignation was accepted, and it was resolved that Mr. Stewart-Greene be elected President until the next annual general meeting in November.

The formation of a Joint Council of Employers and Employees was considered upon the lines adopted by the National Council in Manchester, and, as it was felt to be desirable to have such a Council, the following gentlemen were elected to act:—Messrs. C. L. Roberson, A. Andrews, C. E. Campbell, W. Stewart-Greene, C. E. Wilkinson, F. W. Loasby, and Alexander Davidson.

Book Received.

THE COMPLETE WOODWORKER. Edited by Bernard E. Jones. (London: Cassell & Co., Ltd. 6s. net.)

PROPOSED NEW BUILDINGS AND OTHER WORKS.*

IN these lists care is taken to ensure the accuracy of the information given, but it may occasionally happen that, owing to building owners taking the responsibility of commencing work before plans are finally approved by the local authorities, "proposed" works, at the time of publication, have been actually commenced. Abbreviations:—T.C. for Town Council; U.D.C. for Urban District Council; R.D.C. for Rural District Council; E.C. for Education Committee; L.G.B. for Local Government Board; B.G. for Board of Guardians; L.C.C. for London County Council; B.C. for Borough Council; and P.C. for Parish Council.

BARNSLEY.—Barnsley County B.C. has approved the following plans:—Additions to factory; Redferns Bros., boiler-house for hot water installation of Harbro' Hills-road; C. Marsden & Sons, shed to works, Old Mill-lane; Wilson & Longbottom, joiner's shop to works, Foundry-street; H. Foulstone, garage, Dodworth-road; F. Race, additions to No. 18, New-street.

BEDDINGTON AND WALLINGTON.—At a recent meeting of the U.D.C. it was reported that large works would shortly be erected in Stafford-road.

BEXHILL.—Plans passed by the T.C.:—Motor house, Colebrooke-road, submitted by Mr. G. E. Maynard, for Miss N. Longhurst; servants' hall and additions at "Greylands," Hastings-road, submitted by Mr. G. H. Gray, for Mr. Albert G. Sandeman; motor garage at "Woodford," De La Warr-road, submitted by Mr. J. B. Wall, for Captain Hoad.

BLYTH.—Blyth Council has approved of a Town planning scheme, and instructed the Surveyor to proceed with it.

BRIGHOUSE.—The T.C. have given instructions for the painting (including the necessary repairs) of the St. Joseph's R.C. School, and of the exterior of the Carr Green Council School, to be carried out. Plans approved:—Warehouse, office and coal store, Alexander Mills, for Messrs. Ormerod Bros.; alterations at Phoenix-street Mills, for Messrs. Woodhouse & Mitchell; crane hoist, Owler Ings, for Mr. Chas. Hanson.

BRISTOL.—The Bristol Health Committee recommends the erection by the Corporation of 2,000 houses after the war, the Government having promised substantial aid.

BROMLEY.—Plans recommended for approval:—Messrs. T. Crossley & Son's plan of cellar drainage, "Iddesleigh," Homefield-road; Mr. A. H. Poole's plan of re-drainage, "Northfield," Elmstead-lane; Messrs. Syme & Duncan, Ltd.'s, plan of re-drainage, "Mersham Lodge," London-road.

BURTON.—Proposed alterations to premises occupied by Mr. Butt, at the corner of Waterloo-street, to erect a workroom to accommodate at least twenty girls or women, at a cost of £200.

CARSHALTON.—The U.D.C. has approved plans for an additional factory building at the Eagle Leather Works, Mitcham, for Messrs. Deeds; and for a schoolroom and cellar at Carshalton Park-road, for Mr. Whittaker.

ELLAND.—The Elland U.C. has completed negotiations for the purchase of land, off Jepson-lane, Elland, for the proposed erection of workmen's dwellings. It is not intended to go forward with any scheme of building until after the war.

HACKNEY.—Plans before the B.C.:—H. Holmes & Co. to build and drain a shed at the rear of the dwelling-houses, 1, 3, 5, and 7, Leagrave-street, Lea Bridge-road; J. Hamilton & Son to build an open shed at Sherry's timber wharf and mills on the south-western side of the Lee Navigation Cut, to the north-west of the Homerton Bridge; E. Lindus Forge to make structural alterations at 80, Cazenove-road, for the conversion of the existing dwelling-house into residential flats, and to execute works of drainage in connection therewith; E. Setchell to execute works of drainage at 151, Culford-road.

HALIFAX.—The Halifax Corporation Health Committee has adopted a municipal housing scheme to be submitted to the L.G.B. in response to the central authority's request for proposals to meet after-war needs. The scheme comprises eighty-five dwelling houses of the artisan type to be erected on land belonging to the Corporation at Pellon and Holmfield. A sub-committee was been appointed to consider details of the plans.

HAMMERSMITH.—Drainage plans passed:—At Triplex Glass Co., Hythe-road, for Mr. L. R. Peters; at 407, Goldhawk-road, for Mr. Wood; at Harrow Mission, Harrow-road, for Mr. H. Turner; at 18, 20 and 22, Greenside-road, for Mr. J. Grosch. The L.C.C. have passed plans by Messrs. Waring & Gillow for a building in Bamin-street.

HEMEL HEMPSTEAD.—Plans for additions to the stationery department at Apsley Mills have been approved by the R.D.C.

HENDON.—The Hendon R.D.C. is making application to the L.G.B. to prepare a town-planning scheme for the parishes of Great Stanmore, Little Stanmore, and Edgware, permission having already been given to prepare a scheme for the remainder of their district.

HITCHIN.—Plans approved by the R.D.C.:—Beckley & Turpie, Letchworth, additional bay window; Kryn & Lahy, Letchworth, extensions to steel works; A. Foxley, extensions to Corey's Mill. A plan by Messrs. A. Brown & Son for cottage concrete construction at Lilley Bottom has also been before the Council.

HORNSEY.—Plans have been passed for the conversion into more than one dwelling of No. 66, Church-crescent, Muswell Hill, and No. 38, Avenue-road, Crouch End, both by Mr. W. J. Collins; also for alterations in and additions to Carleton House, Hillfield-avenue, Hornsey, with a view to its conversion into a home for waifs and strays, by Mattock Bros. Wood Green

KIRKCALDY.—The Provost's Committee of Kirkcaldy T.C. have had under consideration a proposal to erect a dry dock at Kirkcaldy Harbour. A sub-committee has been appointed to have plans prepared, &c.

LAMBETH.—Addition to building, Salamanca-place, Messrs. Waring & Nicholson, for Messrs. Doulton & Co.; temporary building, Hercules-road, for Noble Engineering Co; temporary building, Farnham Royal, for Messrs. Saward & Sons; building, corner of Acre-lane and Buckner-road, for Mr. C. S. Banks.

MANSFIELD.—Plans approved by the T.C.:—Rev. A. B. Hargrave, additions to house and shop, Westgate and Jepson's-yard; Sansom Bros. & Co., extension of moulding shed, Union-street; Mansfield and Sutton Co-operative Society, additions to branch business premises, Southwell-road, Rainworth.

POPLAR.—Plans passed: Building and drainage of stable at Walker's Wharf, St. Leonard-street, Mr. G. N. Kent, architect; redrainage of 1, Newley-place, for Mr. Arthur Wood Hill; drainage, Lee Chemical Works, 94, White Post-lane, for Messrs. Cariess, Capel & Leonard; powerhouse, Napier-yard, West Ferry-road, for Messrs. Joseph Westwood & Co.; sanitary accommodation, East London Rope Works, 24, Bow-road, for Messrs. Andrews & Peescod; sanitary accommodation, Sun Flour Mills, St. Leonard-street, for Messrs. J. Hall & Sons; sanitary accommodation, J. G. Palmer & Son's Timber Yard, Preston-road, for Mr. G. T. Warner; sanitary accommodation, 1, Chrisp-street, for Mr. F. Horner.

PLYMOUTH.—Plymouth Housing Committee have decided to inform the L.G.B. that they were desirous of carrying out a housing scheme at an early date, provided the financial facilities to be offered by the Government were adequate. In the opinion of the Committee there were 2,000 houses required in the borough at present, and an additional 1,000 houses should be built at the close of the war. A sub-committee has been appointed to consider plans for the erection of small houses at Prince Rock and Mount Gold and other land belonging to the Corporation, where there were sites available for approximately 250 houses.

PRESTON.—Plans passed by T.C.:—Alterations to workshop, Woodcock-court, and alterations at 26 and 27, Fishergate, for Mr. W. Rawcliffe; garage, Woodlands-avenue, for Mr. W. Milner; hoist, Cuttle-street, for Mr. T. Dryden.

RICHMOND (SURREY).—Plans before the Corporation:—Mr. E. J. Partridge, temporary building at the Peerless Seamless Rubber Co.'s premises, Prince's-street; National Council of the Young Men's Christian Association, temporary recreation hut at the Red Cross Hospital, Richmond-green; the Roll Manufacturing Co., Ltd., temporary building at No. 18, Sheen-road.

RINGWOOD.—The Guardians and D.C. has approved plan of a house for Mr. King, at St. Leonards.

STIRLING.—In reply to the L.G.B.'s inquiry with reference to the provision of houses for the working classes after the war, the T.C. has agreed to state that they are prepared to carry out a housing scheme of from fifty to 100 houses in Winchelhaugh-park in addition to the houses there and in Broad-street and St. Mary's Wynd, which require to be provided under the St. Mary's Wynd improvement and rehousing scheme.

SWANSEA.—The Swansea T.C. has approved in principle of a scheme for the erection after the war of five thousand artisans' dwellings on the Corporation estate at Town-hill.

WILLESDEN.—Plans approved by the U.D.C.:—New lavatories, 6, 6A and 32, Lonsdale-road, Kilburn, by Mr. R. W. McWhinnie for Mr. S. Barnett; alteration to factory premises, Edgware-road, Cricklewood, by Messrs. F. C. Kearley, Ltd.,; preliminary plan, definition of building line, Oaklands-road, Cricklewood, Mr. H. Robert Astley for the Lamplough Radiator and Engineering Co., Ltd.; addition to boiler house, Britannia Pencil Works, Neasden-lane, N.W., by Mr. S. A. S. Yeo, for Messrs. B. S. Cohen, Ltd.; internal additions to form dope room to factory premises, Temple-road; new block of lavatories and new staircase block extension to existing two-story block, Central Works, Cricklewood, by Mr. Robert Angels, for Messrs. S. Smith & Sons (M.A.), Ltd.; greenhouse, 3, Craven-road, Harlesden, by and for Messrs. Parfitt & Co.; alterations to form offices and lavatories in works, Cascade Laundry, Litchfield-gardens, by and for the Williamson Kinematograph Co., Ltd., Willesden. The following plan has also been before the Council:—Engine test house, Cumberland-avenue, by Messrs. Saville & Martin, for Messrs. F. W. Berwick & Co., Ltd. The U.D.C. has approved the following temporary buildings:—Timber and storage shed, Cobbold-road, by and for Messrs. Christopher Dodson, Ltd.; cycle shed, Cumberland-avenue, Park Royal, by Messrs. Saville & Martin, for Messrs. F. W. Berwick & Co., Ltd; timber and storage shed, St. Michael's-road, Cricklewood; drying and inspection shed, Waxlow-road, Acton-lane, by Messrs. T. Jay Evans & Son, for the British Luxfer Prism Syndicate, Ltd.; wood store, Neasden-lane, by Mr. A. Alban H. Scott, for the British Thomson Houston Co., Ltd., Willesden; carpenter's shop, Central Works, Cricklewood, by and for Messrs. S. Smith & Sons (M.A.), Ltd.; shed for packing cases, Central Works, Cricklewood, by and for Messrs. S. Smith & Sons (M.A.), Ltd.; shed, Oaklands-road, Cricklewood, by Mr. W. L. Trant Brown, for the Brilliant Arc Lamp Engineering Co., Ltd.

* See also our list of Competitions, Contracts, &c., on p. 194.

RATES OF WAGES IN THE BUILDING TRADE.

THE following are the present rates of wages in the Building Trade in the principal towns of England and Wales. It must be understood that, while every endeavour is made to ensure accuracy, we cannot be responsible for errors that *may* occur :—

	Masons.	Bricklayers.	Carpenters, Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Masons' Labourers.	Bricklayers' Labourers.	Plasterers' Labourers.
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Aberdare	11	11	11	11	11	10½	10	8	8	8
Accrington	11½	11½	11	9½	9	10	9½	7	7	7
Altrincham	11	1/1	1/-	1/-	9	1/1	11½	9	9	9
Ashton-under-Lyne	1/-	1/1	1/0½	1/-	1/-	1/-	11	8½	9	9½
Barnsley	10½	11½	10½	10½	9	1/-	9½	8½	8½	8½
Barrow-in-Furness	11½	11½	11½	11½	11½	11½	11	8	8½	8½
Barry	1/-	1/-	1/-	1/-	—	1/-	11	9	9	9
Bath	9	9	9	8½	8½	9	8	6½	6½	6½
Bedford	8	8	9	8½	8	9	6½	5½	5½	6
Birkenhead	1/-	1/-	1/1	1/1	1/-	1/-	11	9	9	9
Birmingham	1/0½‡	1/0½‡	1/0½‡	1/0½‡	1/0½‡	1/0½‡	11‡	9½‡	9½‡	9½‡
Bishop Auckland	9	9	10	9½	1/-	9	8	6½	6½	7½
Blackburn	11½	11½	11½	11	10½	1/-	10½	8	8½	8½
Blackpool	1/-	11	11	9½	8½	9½	10½	6	6	6
Bolton	1/1	1/1	1/-	11½	11½	1/-	11½	7½‡	7½‡	9
Bournemouth	8½	10	10	10	8½	10	9½	7½	7½	7½
Bradford	1/0½	1/0½	1/-	1/-	1/0½	10†	10½†	10	10	10
Bridgwater	8½	8½	8½	8½	8½	8	7½	6	6	6
Brighton	9½	9½	9½	9½	—	9½	8	7	7	7
Bristol	11½	1/-	1/-	1/-	—	1/-	11	9	9	9
Burnley	11½	10½	11½	10½	9	10½	10½	7	7½	7½
Burton-on-Trent	9½	10½	10½	10	9	10½	9½	7½	7½	7½
Bury	1/-	1/-	1/-	11	11	11½	10½	8	8½	8½
Cambridge	11	10½	10½	10½	10½	11	9	7½	7½	7½
Cardiff	1/-	1/-	1/-	1/-	1/-	1/-	11	9	9	9
Chatham	9½	10	10	9½	9½	10	8½	7	7	7
Chelmsford	8	7½	8½	9	—	7½	6½	5	5	6½
Cheltenham	9½	9½	9½	9½	—	9½	9½	6½*	6½*	6½
Chester	10½	11	11	11	11	11	10	6½	7½	7½
Chesterfield	9	10½	10	8	9	8½	8½	5½	5½	5½
Colchester	8	8½	8½	9	8	9	6	5½	5½	5½
Coventry	1/0½	1/0½	1/0½	1/0½	1/0½	1/0½	11½	10	10	10½
Crewe	9	9½	9	10½	10	9½	10	7	7	7½
Darlington	11½	11½	11½	11½	10	9½	9	8½	8½	8½
Derby	11	11	11	11	11	10½	9½	8	8	8½
Doncaster	9½	10½	10½	9½	9½	9	8	6½	6½	7½
Dudley	9½	11	11	10	10	9½	8½	8	8	8½
Durham	9½	9½	9½	9½	10	9	8½	6½	6½	7
East Glam. and Mon. Valleys	10	10	10	10	—	—	9	7	7	7
Exeter	9½	9½	9½	9½	9½	9	8½	8	8	8
Folkestone	8½	9	9	9½	8½	9	8	7	7	7
Gloucester	8	9½	9½	8½	8½	9½	8½	7	7	7
Grantham	8	8	7½	7½–8	7½–8	8½	6½	5	5	5
Grays	—	11	11	—	—	11	9½	9	9	9
Grimsby	9	10	10½	10½	10	10	10	8	8	8
Great Yarmouth	8	8	8	—	8	8	6½	5	5	—
Halifax	1/-	1/-	11½	9	9	11	10	9½	9½	9½
Harrogate	10½	9½	11	9	8	1/-	9½	7½	7½	7½
Hartlepools	11½	1/-	1/-	1/-	1/-	10½	9	9	9	9½
Hastings	8½	8	8	8½	8	8	7	6½	5½	6½
Hereford	10	10	10	10	10	10	9	7½	7½	7½
Huddersfield	1/-	11	11½	9½	11	9	11	9½	9½	9½
Hull	11½	11½	11½	11½	11½	1/-	9	9½	9½	9½
Ipswich	9½	9½	9½	10	9½	10	8	7	7	7
Lancaster	10½	10½	10	10	9½	10	9	6	6½	7½
Leamington Spa	9	9½	9½	8½	9	9½	8½	6½	6½	6½
Leeds	1/0½	1/0½	1/-	11½	11½	1/-	10	9½	9½	10
Leicester	11½	11½	11½	11½	11	10½	9	9	9	9½
Lincoln	10½	9½	9½	9	8½	10½	8	6	5½	6½
Liverpool	1/1	1/1	1/1	1/0½	1/0½	1/-	11½	9	9	9
Llanelly	9½	9½	9½	8½	9	8½	8	5½	5½	5½
London	1/1½	1/1½	1/1½	1/1½	—	1/2	11	10	10	10
Loughborough	10	10	10½	10	10	10	9	8½	8½	9½
Luton	9½	10½	10½	8½	9	8½	9½	8½	8½	8½
Maidstone	10	10	10	10	10	10	9	7	7	7
Manchester	1/1	1/1	1/1	1/0½	11	1/2	1/-	9	9	9
Mansfield	8½	11	10½	8½	—	10½	9	8	8	8
Merthyr Tydfil	11	11	11	11	11	11	10	8½	8½	8½
Middlesbrough	11½	1/-	1/-	1/-	1/-	10½	9	9	9	9½
Newcastle-on-Tyne	1/0½	1/0½	1/0½	1/0½	1/-	10½	11	9½	9½	9½
Newport, Mon.	11½	11½	11½	11½	11½	1/0½	10½	8½	8½	8½
Northampton	11	11	11	11	11	11	10	8½	8½	8½
Norwich	8½	8½	8½	8½	8	8½	7½	6	6	6
Nottingham	1/-	1/-	1/-	11½	11½	1/1	11½	9½	9½	10
Oldham	1/-	1/-	1/1	11½	11	11½‖	11½	8½	8½	9
Oxford	9½	9	9	9	9	9	8	6½	6½	6½
Plymouth	10*	10*	10*	10*	10*	10*	8½*	8½	8½	8½
Pontypridd	11	11	11	11	11	11	10	8	8	8
Portsmouth	10½	10½	10½	10½	10½	9½	8½	8	8	8
Preston	10½	1/-	11	10½	10½	11	10½	7½	8	8
Reading	9	9½	9½	10½	—	9½	8½	6½*	6½*	6½*
Rochdale	11½	11½	1/-	11½	10½	1/0½	11	8½	8½	9
Rochester	8	10	10	9	9	10	8½	7	7	7
Rugby	11	11	11	11½	1/-	11	10	8	8	9
St. Albans	10	10	10	10	10	10	9	8	8	8½
St. Helen's	1/-	1/-	1/-	1/-	1/-	11	10½	7	7½	8
Scarborough	9	9½	9	8½	8	9	8	7	7	7
Sheffield	10½	11½	1/1½	1/1	1/1	1/1	10	10½	10½	10½
Shrewsbury	8½	9½	9½	9½	—	8½	7	6½	6½	6½
Southampton	11½	11½	11½	11½	11½	11½	10½	8½	8½	8½
Southend-on-Sea	9	9	9	9	P'cework	9	7	6	6	6
Southport	11½	11	11½	11	11	11	11	7	7½	7½
South Shields	1/0½	1/0½	1/0½	1/0½	1/-	10½*	11	9½	9½	9½
Stockport	1/1	1/0½	1/0½	11½	10½	1/-	10½	8½	9	9
Stockton-on-Tees	11½	1/-	1/-	1/-	1/-	10½	9	9	9	9½
Stoke-on-Trent	11½	11½	11½	11½	—	10½	10½	8½	8½	8½
Stroud	9	9	9	9	9	9	8½	7	7	7
Sunderland	1/-	1/-	1/-	1/-	1/-	9½	11	9	9	9
Swansea	1/-	1/-	1/-	1/-	1/-	1/-	11½	9	9	9
Taunton	8	8	8	8	—	8	7	5½	5½	5½
Torquay	10	10	10	10	10	10	10	8	8	8
Wakefield	10	11	10½	9½	8½	10½	10	9	9	9
Walsall	11½	11	11	11	11	11	9½	8½	8½	8½
Warrington	11	1/-	11½	1/-	1/-	11½	10½	7	7½	7½
West Bromwich	11	11	10½	10½	—	10	9	8	8	8
Wigan	11½	1/-	11½	11	10½	11½	10½	9	9	9
Windsor	9	9	9	10	—	9	—	6	6	6
Wolverhampton	1/-	1/-	1/-	11	11	1/-	10½	9	9	9
Worcester	9	9½	9½	9½	9½	9½	8	7½	7½	7½
York	9½	9½	9½	10½	10	10½	8½	8½	8½	8½

The Masons' rate given is for bankers; fixers usually ½d. per hour extra.

* War bonus of 2s. per week granted. † War bonus of 3s. per week granted. ‡ War bonus of 2s. 6d. per week granted.
‖ War bonus of 6s. per week granted. § 1d. per hour extra for men engaged on munition work.

Competitions, Contracts, &c.

For some contracts still open, but not included in this List, see previous issues. Those with an asterisk (*) are advertised in this number. Contracts, iv; Tenders, —; Public Appointments, xxviii; Auction Sales, xxx. Certain conditions beyond those given in the following information are imposed in some cases, such as that advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders; and that deposits are returned on receipt of a bona-fide tender unless stated to the contrary.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in.

*** It must be understood that the following paragraphs are printed as news, and not as advertisements; and that while every endeavour is made to ensure accuracy, we cannot be responsible for errors that *may* occur.

BUILDING AND PAINTING.

SEPTEMBER 29.—**Horden.**—PAINTING.—The Horden Workmen's Club Committee, Eden-street, Horden, invite tenders for the painting of all the outside doors, windows, door-frames, &c., of the Club; also for the painting of the whole of the inside of large bar. Particulars of the Secretary, 41, Thirteenth-street, Horden. Mr. Thos. Crake, Secretary.

OCTOBER 2.—**Coventry.**—HUTMENTS.—The Committee of Coventry and Warwickshire Hospital invite tenders for the erection of hutments for the domestic staff at the hospital, Stoney Stanton-road, Coventry. Plans, &c., of Mr. Herbert W. Chattaway, Architect, Trinity Churchyard, Coventry.

OCTOBER 3.—**Dewsbury.**—RESTORATION.—For the restoration of Raven's Wharf Mills, Dewsbury. Plans, &c., of Messrs. Kirk, Sons & Ridgway, F.R.I.B.A., Architects, Surveyors and Valuers, Market-place, Dewsbury.

NO DATE.—**Salisbury.**—PAINTING.—For external painting at the Salisbury Joint Isolation Hospital. Specifications, &c., of Mr. Alfred C. Bothams, Architect, 32, Chipper-lane, Salisbury.

FURNITURE, MATERIALS, etc.

OCTOBER 1.—**Rosslynlee.**—MATERIALS.—Supply to the Midlothian and Peebles District Asylum, Rosslynlee, of builders' materials, &c. Forms of the Clerk and Treasurer, 19, Heriot-row, Edinburgh.

ENGINEERING, IRON AND STEEL.

OCTOBER 27.—**Dublin.**—RENEWAL OF BRIDGES.—The Directors of the Midland Great Western Railway of Ireland Co. invite tenders for the complete renewal, in reinforced concrete and steel, of Newcomen Bridge, North Strand-road, Dublin, carrying the North Strand-road over the M.G.W. Rly. running lines; or, alternatively, for the construction only, of the reinforced concrete, slabs, beams and columns in connection with this work, erection to be carried out by the railway company; and for the complete renewal in reinforced concrete of Summerhill Bridge, Ballybough-road, Dublin, carrying the Ballybough-road over the M.G.W. Rly. running lines; or, alternatively, for the construction only of the reinforced concrete slabs and beams in connection with this work, erection to be carried out by the railway company. Specifications, &c., of Mr. Wm. Purcell O'Neill, the Company's Chief Engineer, Broadstone Station, Dublin. Deposit 5 guineas.

NO DATE.—**London.**—CASTINGS, &C.—Supply to the Islington B.C. of (*a*) castings and other ironwork, and (*b*) iron, steel and tools. Forms of the Borough Engineer, Town Hall, Upper-street, Islington, N. 1.

Public Appointments.

*NO DATE.—**London.**—The Borough Treasurer of Southwark asks for applications for vacant post of book-keeper. Apply Borough Treasurer, Southwark Town Hall, Walworth-road, S.E. 17

Auction Sales.

OCTOBER 4.—**Harefield Valley.**—Messrs. Joshua Baker, Cooke & Standen will sell Broadwater Farm, with house, buildings, and 144 acres. For particulars, &c., apply to the Auctioneers, 11, Southampton-row, W.C. 1.

"The Western Front."

We have received a copy of the ninth part of "The Western Front," containing drawings by Mr. Muirhead Bone, with letterpress written at British headquarters. "The Western Front" is published for the Government from the offices of *Country Life*, Ltd. Price 2s. net.

PRICES CURRENT OF MATERIALS.

[Owing to the exceptional circumstances which prevail at the present time, prices of materials should be confirmed by inquiry.—Ed.]

**** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the highest or lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

Per 1,000 Alongside, in River Thames.	£ s. d.
Best Stocks	2 10 0
Picked Stocks for Facings	3 5 0

Per 1000, Delivered at Railway Depot, London.	£ s. d.		£ s. d.
Flettons	1 18 0	Best Blue Pressed Staffordshire	5 15 0
Best Fareham Red	4 0 0	Do. Bullnose	6 0 0
Best Red Pressed Ruabon Facing	6 0 0	Best Stourbridge Fire bricks	9 5 0

GLAZED BRICKS—			
Best White, Ivory, and Salt Glazed Stretchers	14 17 6	D'ble Str'tch'rs	20 7 6
Headers	14 7 6	D'ble Headers	17 7 6
Quoins, Bullnose and 4½in. Flats	18 7 6	One Side and two Ends	21 7 6
		Two Sides and one End	22 17 6
		Splays and Squints	19 17 6

Glazed bricks priced at so much each, 25 per cent. advance on list.

Second Quality, £1 per 1,000 less than best.

	s. d.		
Thames Ballast	8 9	per yard, delivered.	
Pit Sand	11 0		
Thames Sand	12 0	,, ,,	,,
Best Washed Sand	12 0	,, ,,	,,
¾in. Shingle for Ferro-Concrete	11 6	,, ,,	,,

Per ton, delivered.	£ s. d.		£ s. d.
Best Portland Cement	2 10 0	..	2 13 0

Do. £2 6s. alongside in 80-ton lots.
Ferrocrete 2s. 6d. per ton extra on above.
Best Ground Blue Lias Lime 1 7 6 at rly. depot.
NOTE.—The cement or lime is exclusive of the ordinary charge for sacks. The sacks are charged at 1s. 3d. each and credited at 1s. each if returned in good condition within three months.
Grey Stone Lime ..... 47s. 6d. per ton delivered.
Stourbridge Fireclay in s'cks 37s. 6d. per ton at rly. dpt.

STONE.

BATH STONE—delivered in railway trucks at	s. d.
Westbourne Park, Paddington, G.W.R., or South Lambeth, G.W.R., per ft. cube	1 7
Do. do. delivered in railway trucks at Nine Elms, L. & S.W.R., per ft. cube	1 8½
Do. do. delivered on road waggons at Nine Elms Depot	1 9½

PORTLAND STONE—
Brown Whitbed, in random blocks of 20 ft. average, delivered in railway trucks at Westbourne Park, G.W.R., South Lambeth, G.W.R., or Nine Elms, or L. & S.W.R., per ft. cube 2 5½
Do. do. delivered on road waggons at Pimlico Wharf or Nine Elms Depot, per ft. cube.. 2 6½
White basebed, 2d. per ft. cube extra.

RANDOM BLOCKS—Per Ft. Cube, delivered at Rly. Dpot.

	s. d.		s. d.
Ancaster in blocks	2 0	Closeburn Red Freestone	2 2
Beer in blocks	1 7½	Red & White Mansfield random block	2 9
Grinshill in blocks	2 4	Yellow Magnesian Limestone do. do	3 3
Darley Dale in blocks	2 5		

YORK STONE—*Robin Hood Quality.*

Per Ft. Cube, Delivered at Railway Depot	s. d.
Scappled random blocks	3 4

Per Ft. Super. Delivered at Railway Depot.

6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 5
4 in. rubbed two sides, ditto	2 8
3 in. sawn two sides slabs (random sizes)	1 0½
2 in. to 2½ in. sawn one side slabs (random sizes)	0 8½
1½ in. to 2 in. ditto, ditto	0 6½

HARD YORK—
Per Ft. Cube, Delivered at Railway Depot.

Scappled random blocks	3 0

Per Ft. Super., Delivered at Railway Depot.

6 in. sawn two sides landing to sizes (under 40ft. super.)	2 3
6 in. rubbed two sides ditto	2 7
3 in. sawn two sides slabs (random sizes)	1 0
2 in. self-faced random flags	0 5

TILES.

	Per 1,000 f.o.r. London. £ s. d.
Best machine-made tiles or hand-made sand-faced tiles from either Broseley or Staffordshire district	3 0 0
Ornamental ditto	3 2 6
Hip and valley tiles (per dozen)	0 6 0

SLATES.

	Per 1,000 of 1,200 f.o.r. London. £ s. d.
Best Blue Bangor Slates, 20 by 10	13 5 0
,, ,, 16 by 8	6 12 6
First quality ,, 20 by 10	12 15 0
,, ,, 16 by 8	6 10 0
Best Blue Portmadoc 20 by 10	13 5 0
,, ,, 16 by 8	6 12 6
First quality ,, 20 by 10	12 12 6
,, ,, 16 by 8	6 7 6

WOOD.

BEST BUILDING REDWOOD. Imported sizes.
Deals: 4 in. by 12 in., 4 in. by 11 in., 3 in. by 11 in., 4 in. by 9 in., and 2 in. by 11 in. .....
3 in. by 9 in., 2½ in. by 9 in., and 2 in. by 9 in. .....

Softwood stocks controlled by the Director of Materials, consequently prices must be withdrawn

WOOD (*Continued*).

BEST BUILDING REDWOOD.
Battens: 2 in., 2½ in., and 3 in. by 8 in. .....
2 in., 2½ in., and 3 in. by 7 in. .....
2 in., 2½ in., and 3 in. by 6 in. .....
Scantlings: 2 in. by 3 in., 2 in. by 3½ in., 2 in. by 4 in., 2 in. by 4½ in. ....
3 in. by 4 in., and 3 in. by 4½ in. .....
Boards: 1 in., 1¼ in., and 1½ in. by 6 in. and 7 in. .....
¾ in. .....
Seconds .....
Sawn pitch pine logs (about 35 cu. ft. average .....
Do. 6 in. to 10 in. ..

Best Pitch Pine Deals ....
Under 2 in. thick .....

JOINERS' WOOD

White Sea First Quality Red: 4 in. by 11 in. ..
3 in. by 11 in., and 2 in. by 11 in. .....
4 in. by 9 in. .....
3 in. by 9 in., and 2½ in. by 9 in. .....
3 in. by 11 in. boards ..
7 in. and 8 in. battens ..
7 in. and 8 in. boards ...
Archangel White Deals—
Best 3 in. by 9 in. and 10 in. and 11 in. .....
Seconds, do. .....
U.S. Battens .....
Prepared Floorings and Matchings. Seconds
Swedish Red and equal—
1¼ in. by 6½ in. planed and shot .....
1¼ in. by 6½ in. planed and matched .....
1 in. by 6½ in. planed and shot .....
1 in. by 6½ in. planed and matched .....
¾ in. by 6½ in. planed, matched, and beaded, or V-jointed .....
1 in. by 6½ in. do. .....
Columbian or Oregon Pine, best quality .....
Yellow Pine—First regular sizes .....
Oddments .....
Seconds, regular sizes ..
Oddments .....
Kauri Pine—Planks per ft. cube .....

Softwood stocks controlled by the Director of Materials, consequently prices must be withdrawn.

Dry Wainscot Oak, per ft. super, as inch	0 1 3	..	0 1 6		
¼ in. do. do.	0 0 10	..	0 1 2		
Dry Mahogany—Honduras, Tabasco, per ft. super, as inch	0 1 6	..	0 2 6		
Cuba, Mahogany	0 1 6	..	0 2 6		
Dry Walnut, American, per ft. super, as inch	0 1 6	..	0 2 6		
French, "Italian," Walnut	0 1 6	..	0 2 6		
Teak, per load (Rangoon or Moulmein)	30 0 0	..	40 0 0		
Do. do. (Java)	30 0 0	..	40 0 0		
American Whitewood planks, per ft. cube	0 9 0	..	0 10 0		
Glue, per cwt.	5 0 0	..	5 5 0		

METALS.

JOISTS, GIRDERS, &c.

Rolled Steel Joists, ordinary sections, basis price .....
Plain Compound Girders, ordinary sections .....
Plain Compound Stanchions
Angles, Tees, and Channels, ordinary sections .....
Flitch Plates .....
Cast Iron Columns and Stanchions, plain ordinary patterns .....

Prices controlled by the Ministry of Munitions.

WROUGHT-IRON TUBES AND FITTINGS—
(Discount off List for lot of not less than £4 net value delivered direct from works. 5 per cent. less carriage forward if sent from London stocks.)

	Tubes.		Fittings.
Gas	45	....	50
Water	40	....	47½
Steam	35	....	45
Galvanised gas	27½	....	42½
,, water	18½	....	40
,, steam	12½	....	37½

L.C.C. SOIL PIPE—

Pipes Coated.	s. d.		London Prices. Bends. s. d.		Branches. s. d.
2 in. per yd.	2 8	....	2 1	each	2 6
2½ in. ,, ..	3 1	....	2 4	,,	3 2
3 in. ,, ..	3 10	....	2 6	,,	3 9
3½ in. ,, ..	4 2	....	3 2	,,	4 4
4 in. ,, ..	4 8	....	3 6	,,	5 0

RAIN-WATER PIPES, &c.

Pipe.	s. d.		London Prices. Bends. s. d.		Branches. s. d.
2 in. per yd.	2 0	....	1 2	each	1 8
2½ in. ,, ..	2 2	....	1 5	,,	2 0
3 in. ,, ..	2 6	....	1 9	,,	2 6
3½ in. ,, ..	3 0	....	2 1	,,	3 0
4 in. ,, ..	3 3	....	2 6	,,	3 8

L.C.C. DRAIN PIPES,—9 ft. lengths. London Prices. 4 in.. 5s. 3d. .. 5 in., 6s. 3d. .. 6 in.. 7s. 6d.

	Per ton in London. £ s. d.		£ s. d.
IRON—			
Common Bars	16 10 0	to	17 0 0
Staffordshire Crown Bars—good merchant quality	16 10 0	..	17 10 0
Staffordshire "Marked Bars"	17 10 0	..	18 0 0
Mild Steel Bars	19 0 0	..	19 10 0

METALS (*Continued*).

	Per ton in London. £ s. d.		£ s. d.
Steel Bars, Ferro-Concrete quality, £19 basis price.			
Hoop Iron, basis price	20 0 0	..	20 10 0
,, Galvanised	33 0 0	..	—
(* And upwards, according to size and gauge.)			
Sheet Iron Black—			
Ordinary sizes to 20 g.	22 0 0	..	22 10 0
,, ,, 24 g.	23 0 0	..	23 10 0
,, ,, 26 g.	24 0 0	..	24 10 0
Sheet Iron, Galvanised flat, ordinary quality—			
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	32 0 0	..	—
Ordinary sizes to 22 g. and 24 g.	32 0 0	..	32 10 0
Ordinary sizes to 26 g.	35 0 0	..	35 10 0
Sheet Iron, Galvanised, flat, best quality—			
Ordinary sizes to 20 g.	35 0 0	..	—
,, ,, 22 g. and 24 g.	35 10 0	..	—
Ordinary sizes to 26 g.	38 10 0	..	—
Galvanised Corrugated Sheets—			
Ordinary sizes, 6 ft. to 8 ft.	31 0 0	..	—
Ordinary sizes, 22 g. and 24 g.	31 10 0	..	—
Ordinary sizes, 26 g.	32 0 0	..	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. to 20 g. and thicker	24 10 0	..	—
Best Soft Steel Sheets, 20 g. and 24 g.	24 15 0	..	—
Best Soft Steel Sheets, 26 g.	26 10 0	..	—
Cut Nails, 3 in. to 6 in.	28 0 0	..	29 0 0
(Under 3 in., usual trade extras.)			

LEAD, &c.

	Delivered in London. £ s. d.		
LEAD—Sheet, English, 4 lb. and up	38 10 0	..	—
Pipe in coils	39 0 0	..	—
Soil Pipe	42 0 0	..	—
Compo pipe	42 0 0	..	—

NOTE—Country delivery, 20s. per ton extra; lots under 5 cwt., 1s. 6d. per cwt. extra. Cut to sizes, 2s. cwt. extra. Orders for over 1 cwt. Sheet Lead or Pipe, or 28 lbs. Solder should be accompanied by a certificate or licence, which can be obtained from the Director of Materials [A.N.2 (E)], Hotel Victoria, S.W. Smaller quantities than the above can be obtained by making a written declaration to the Manufacturer or Merchant that the metal is wanted for urgent renewals or repairs, and giving the name of the job for which it is required.

COPPER—					
Strong Sheet	per lb.	0 1 6	..	—	
Thin ,,	,,	0 1 8	..	—	
Copper nails	,,	0 1 6	..	—	
Copper wire	,,	0 1 8	..	—	
BRASS—					
Strong Sheet	,,	0 1 6	..	—	
Thin ,,	,,	0 1 8	..	—	
TIN—English Ingots	,,	0 2 6	..	—	
SOLDER—Plumbers'	,,	0 1 1	..	—	
Tinmen's	,,	0 1 5	..	—	
Blowpipe	,,	0 1 7	..	—	

GLASS.

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES AND IN SQUARES IN ORDINARY SIZES.

Per Ft.			Per Ft.
15 oz. fourths 5d.		26 oz. thirds	7½d.
,, thirds	5½d.	32 ,, fourths	8d.
21 ,, fourths 6d.		,, thirds	9d.
,, thirds	6½d.	Fluted Sheet, 15 oz.	6½d.
26 ,, fourths	6½d.	,, 21 ,,	7½d.

Extra price according to substance for squares cut from stock.

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.

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White Rolled Cathedral	5d.
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PAINTS, &c.

		£ s. d.
Raw Linseed Oil in pipes per gallon		0 5 3
,, ,, ,, in barrels	,,	0 5 4
,, ,, ,, in drums	,,	0 5 7
Boiled ,, ,, in barrels	,,	0 5 7
,, ,, ,, in drums	,,	0 5 10
Turpentine in barrels	,,	0 5 4
,, in drums	,,	0 5 7
Genuine Ground English White Lead, per ton (In not less than 5 cwt. casks.)		53 10 0
GENUINE WHITE LEAD PAINT— "Blackfriars," "Nine Elms," "Park," and other best brands (in 14 lb. tins) not less than 5 cwt. lots.. per ton delivered		69 0 0
Red Lead, Dry (packages extra) .. per ton		42 0 0

Orders for White and Red Lead and any Paint containing Lead must be accompanied by a certificate or licence, which can be obtained from the Director of Materials [A.N. 2 (E.)], Hotel Victoria, S.W.

Best Linseed Oil Putty	per cwt.	0 14 6
Stockholm Tar	per gallon	0 3 6
Filocol	per cwt.	0 13 6

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak	0 8 0
Pale Copal Oak	0 10 0
Superfine Pale Elastic Oak	0 12 6
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Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
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Finest Pale Durable Copal	0 18 6
Extra Pale French Oil	1 1 0
Eggshell Flatting	0 18 0
White Pale Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 0
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 0
Berlin Black	0 16 0
Knotting	0 18 0
French and Brush Polish	0 12 0

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Wednesday*.

* Denotes *accepted*. † Denotes *provisionally accepted*.
‡ Denotes *recommended for acceptance*.

GLASGOW.—For the reinforced concrete superstructure for boiler-house, turbine-room and workshop at Dalmarnock, for the Corporation :—
* Train & Taylor £64,539 1 6

GLASGOW.—For painting works at Loch Lomond Park, for the Corporation :—
* R. C. Williamson £76 10

GLASGOW.—Supply of boiler for heating installation at Kinning Park Public Hall, for the Corporation :—
* George Munro £121 5

GLASGOW.—For renewing steps of footbridge over River Kelvin, Partick, for the Corporation :—
* George Sharp & Son £72 16 6

LITTLEBURN.—For the construction in reinforced concrete of two dosing chambers and carrying troughs at the Littleburn Sewage Works, for the Brandon and Byshottles U.D.C. Mr. G. G. Donkin, Surveyor, Langley Moor :—
Walton Bros., Crook, Durham.... £95 10 0

LONDON.—The following tenders are recommended for acceptance by the Westminster City Council for supplies :—H. Covington & Sons, Ltd., for ballast and sand, for six months ; Acme Flooring and Paving Co. (1904), Ltd., for carriageway repairs (wood pavement) (new work), subject to clause as to strikes, lock-outs, &c., for three months.

PRESTON.—For painting work at the Grammar School for the Corporation :—
* S. B. Wilding & Son..... £78

London Gas Prices.

It is reported that some of the London gas companies are about to increase the price of gas, but so far as can be gathered only one company meditates any immediate increase in price. On the other hand, at least two companies are lowering the price. The Wandsworth, Wimbledon and Epsom Gas Company announce that the price of gas will be raised as from the Michaelmas quarter. The North Middlesex Gas Company are reducing the price of gas, as from October 1. The directors of the Hornsey Gas Company also announce that from the date of taking the meter indexes for the quarter ended June, 1917, the price of gas will be reduced.

The Decimal System.

A *questionnaire* was recently circulated among the members of the Chartered Institute of Secretaries for the purpose of obtaining opinions in regard to the adoption of a decimal system of coinage in the United Kingdom, and the substitution of the metric system for the existing United Kingdom weights and measures. Of the replies received 85 per cent. considered that a change to a decimal system of coinage would be favourable to the business in which they were engaged, and 66 per cent. favoured a basis of coinage in preference to the "Imperial Crown" or dollar basis. In regard to weights and measures, 86 per cent. favoured a change to the metric system, 53 per cent. of whom already used that system in their business. One member expressed the opinion that a strong Commission of able men should be asked to decide whether the Continental system, which was forced upon countries at a time when violence rather than reason, prevailed, had been really satisfactory.—*The Times*.

TO CORRESPONDENTS.

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All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We cannot undertake to return rejected communications; and the Editor cannot be responsible for drawings, photographs, manuscripts, or other documents, or for models or samples sent to or left at this office, unless he has specially asked for them.

The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

All drawings sent to or left at this office for consideration should bear the owner's name and address on either the face or back of the drawing. Delay and inconvenience may result from inattention to this.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

N.B.—Illustrations of the First Premiated Design in any important architectural competition will always be accepted for publication by the Editor, whether they have been formally asked for or not.

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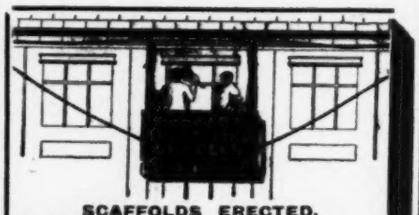

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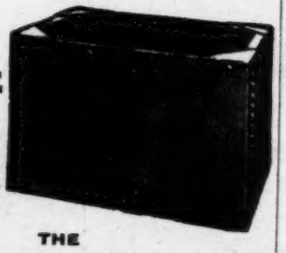

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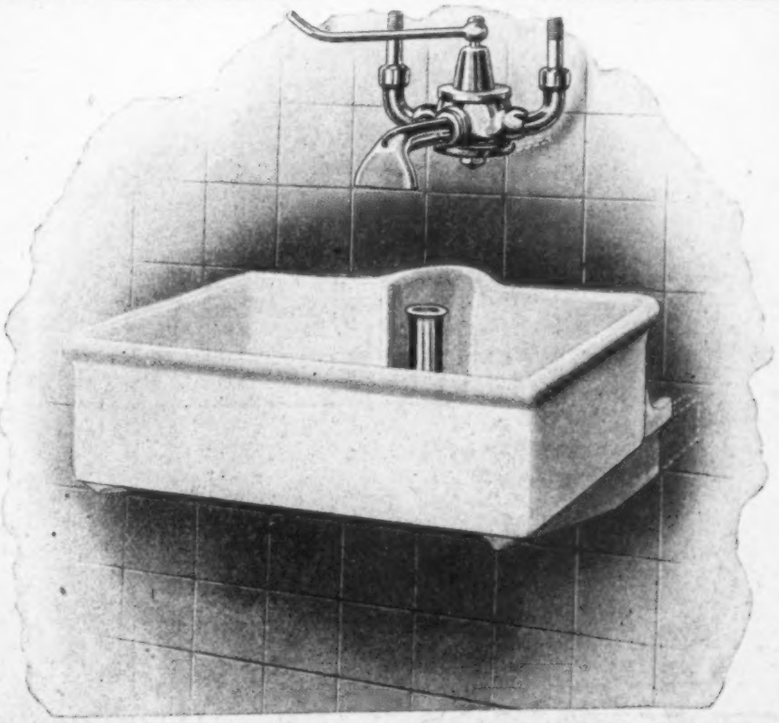

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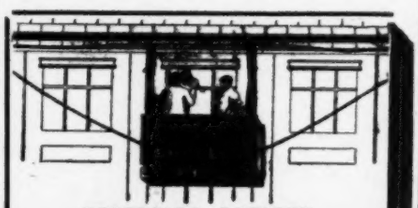

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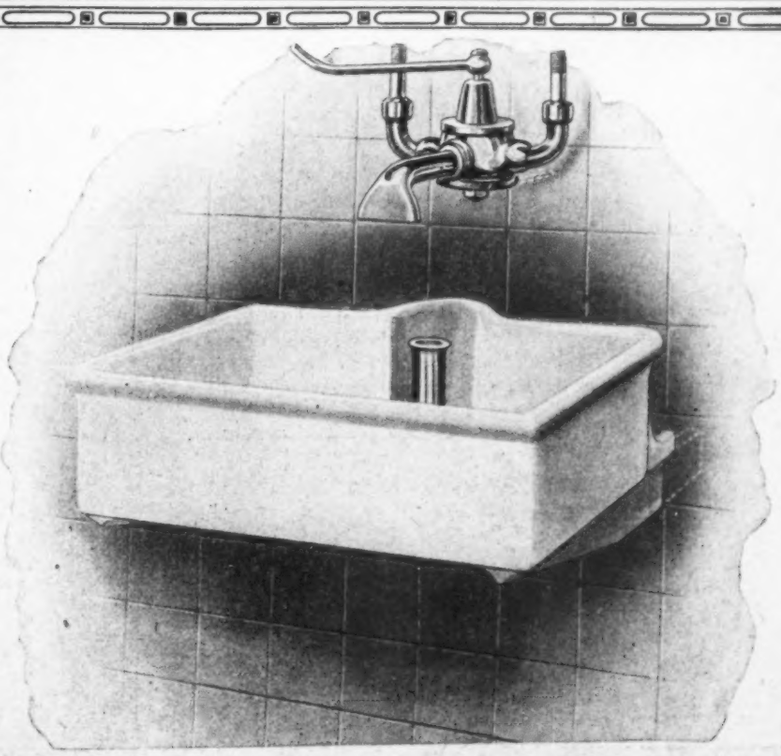

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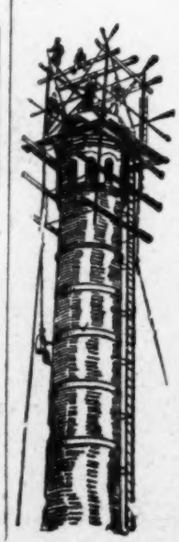

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